What Happens If Auto Cooling Is Added . . *Pp. 16-19*

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BHC Drive To Push Piped Heating, Cooling

NEW YORK CITY—A united-industry approach "to deal with the question of electric heat" has been launched for the hydronics industry by the national Better Heating-Cooling Council with the support and cooperation of the Joint Industry Program Committee of the Plumbing and Pipe Fitting Industry, it was announced recently.

The program will be integrated with the BHC nationwide drive to promote increased sales of piped heating and cooling in all markets, buildings, and types of construction, according to Franklin Greene, BHC executive director and secretary.

Designed also to provide factual information and sales tools

(Continued on Back Page, Col. 1)

Chart Course To Aid Industry, Nation

ASHRAE Research Lab Plans Emphasize Environmental Studies

NEW YORK CITY—Research activities of the American Society of Heating, Refrigerating & Air-Conditioning Engineers will be concentrated on environmental research, in the belief that by so doing the society will make its greatest possible contribution to the progress of the air conditioning industry — and taking into consideration the contributions that air conditioning can make to the general welfare of the nation.

Says ASHRAE Research Laboratory director, Prof. Burgess H. Jennings, a man who has spent his life in air conditioning engineering and research: "Environment is the key to everything we are doing here. We have so much to learn about it; we are only beginning to find out how a person's environment affects everything from his ability to work to his health."

In outlining a quite definite program for the immediate future of ASHRAE's research program, those who direct this activity state that the society will continue support of the other general interest projects, now conducted cooperatively in other institutions such as universities, but the emphasis will be on environmental research.

Prof. Richard C. Jordan of the University of Minnesota, speaking as chairman of ASHRAE's Research and Technical Committee, talks of "development of a creative research program with long-range leadership as its goal." Pointing to the Society's Research Laboratory in Cleveland as the nucleus of such a program, he adds:

"It is the unanimous opinion of our committee that the laboratory should be doing research in areas in which it and its personnel are uniquely equipped to operate. It is, moreover, our feeling that at the present time the laboratory's research activities should be concentrated on environment as it affects humans. Nowhere in the world is a concentrated effort being made to solve any of

(Continued on Page 4, Col. 5)

Electric House Heating Symposium, Exposition Draws 2,000 — 65 Exhibit

CHICAGO—"Standing Room Only" was the order of the day when more than 2,000 people instead of an expected 500 showed up for the first National Electric House Heating Symposium & Exposition held here March 21 to 23.

Such interest in heating on the part of the electrical industry could indicate increasingly stiff competition for conventional fuels as well as air conditioning and heating contractors, who were conspicuously absent.

Sponsored by the Electric House Heating Section of the National Electrical Manufacturers Association, the symposium consisted of three general sessions and seven seminars.

Detailed accounts of many of the talks and discussions, as well as other developments announced in connection with the meetings, will appear in future issues of the NEWS.

There were 65 exhibitors in the show. Heat pumps were shown by five, central and duct type electric heaters by seven, radiant baseboard and panel heaters by 33, controls by eight, and insulation by six exhibitors.

Electrical contractors, who accounted for 14% of the attendance, displayed considerable interest in air conditioning, heat pumps, and central electric fur-

(Continued on Page 29, Col. 1)

Cory-Mitchell Suit Settled Amicably

CHICAGO—Cory Corp.'s lawsuit against certain former officers, directors, and stockholders of Mitchell Mfg. Co. has been resolved by an amicable settlement, according to J. W. Alsdorf, Cory president.

In a letter to Cory stockholders, Alsdorf said the settlement was approved at a special meet-

(Continued on Back Page, Col. 4)

L. A. Changes Code on Attic Installations

LOS ANGELES — New code regulations pertaining to the installation of air conditioning units in attic spaces of one-family dwellings have been issued by the Los Angeles Dept. of Building & Safety.

The rules were listed in a department bulletin which says that air conditioning units with self-contained automatic control and protective devices may be installed in the attic spaces of one-family dwellings under the following conditions:

"1. The unit shall contain no manually operable control or protective devices such as fuses, circuit breakers, manually reset

(Continued on Page 4, Col. 4)

'59 Auto Air Conditioning Sales Hit 580,721 Units

DETROIT — 1959 automobile air conditioner sales totaled 580,721 units, far surpassing estimated sales of 500,000 to 550,000 made at the beginning of the year and 51.3% ahead of 1958 sales, according to a survey of sales made by AIR CONDITIONING, HEATING & REFRIGERATION NEWS.

The big story in 1959 was increased sales by the automobile manufacturers. As a group they increased their total sales 75.4% over 1958.

Independent manufacturers were not standing still, however. They upped 1959 sales 10.5% over 1958, though their percentage of total automobile air conditioner sales dipped to 27.1%.

As in 1958 about 80% of the automobile manufacturers sales were made at the factory, with their dealers accounting for 85,600 installations. This together with the 157,627 units sold by the independent manufacturers indicates that approximately 60% of all installations are made at the factory.

* * *

YEAR	UNIT SALES
1953	40,600
1954	90,000
1955	176,000
1956	285,110
1957	405,404
1958	383,867
1959	580,721
Total	1,961,702

Table I shows auto air conditioner sales by automobile manufacturers and independent air conditioning manufacturers as estimated by AIR CONDITIONING, HEATING & REFRIGERATION NEWS, based on a survey of these manufacturers and component suppliers.

Ford and Chevrolet showed the biggest increases volume wise while Pontiac and American Motors had strong increases

(Continued on Page 29, Col. 1)

Inside Dope

By GEORGE F. TAUBENECK

Learn to live and laugh — thus delay your epitaph

Refrigerant Out of This World
Let's Heed Thomas Jefferson
Can You Top This?
Out of Our Mailbag
Stories of the Week
Quotes of the Week

Refrigerant Out of This World

Originally developed as a refrigerant, an "esoteric" chemical now is keeping U.S. satellites *positionally stable* while they collect data which will advance future adventures into outer-space exploration.

Fused with nitrogen to provide sudden thrust in reaction-jet-nozzles, du Pont's "Freon-14" (tetrafluoromethane) — a compound that boils at -198° F. —helps power a potent new American missile guidance system.

Fuelled by this mixture of Freon and nitrogen, and controlled by electronic signals, *The Discoverer* is a BIG DEAL.

Its pneumatic attitude mechanism weighs about 70 lbs.—including the torque motors and thrust nozzles, pressure regulator, propellent lines, manifolds, and metal "bottle" containing sufficient supply of nitrogen and Freon-14.

Freon was chosen for this orbital guidance system, engineers explain, because it packs a lot of power in a small weight space.

At a predetermined point, and on a selected "pass," the nose cone (re-entry vehicle) can be fired out of orbit into a trajectory calculated to bring it back to earth.

Of the eight Discoverer satellites launched by the Air Force Ballistic Missile Div. (from the Vandenberg Air Force Base in California) all but the first have been equipped with Freon orbital guidance.

Final stage engine, provided by Bell Aircraft under a subcontract to Lockheed, is an integral part of this missile-satellite. After burnout, it remains with the orbiting vehicle.

This Last Deal consumes a superpowerful fuel called "unsymmetrical diamethylhydrazine," which includes a red fuming nitric acid as an oxidizer.

Try *that* name on your piano.

Anyway, three cheers for Freon!

Let's Heed Thomas Jefferson

As a final legacy Thomas Jefferson wrote the following wise advise to the American

(Continued on Page 6, Col. 1)

R. I. Bill Would Regulate Cooling, Refrigeration Work

PROVIDENCE, R. I.—State regulation of the installation and maintenance of refrigeration and air conditioning systems and equipment would be established by a bill introduced in the State Senate recently.

Introduced by Sen. Arthur A. Belhumeur (D., Central Falls), the bill was referred to the Senate judiciary committee.

The measure would create a refrigeration and air conditioning industry examining board in the State Dept. of Labor. The board would be responsible for licensing air conditioning and refrigeration employes and would have authority to revoke or suspend licenses.

The board would be composed of five members. Four would be named by the governor from a list or lists furnished by the Providence Chapter of the Refrigeration Service Engineers Society. The fifth member would be selected by the governor from the public at large.

Sacramento ASHRAE To Meet April 6

SACRAMENTO, Calif.—"Recent Developments in Thermoelectric Refrigeration and Power Generation" is the topic of Charles J. Frank for the April 6 dinner meeting of Sacramento Valley Chapter, American Society of Heating, Refrigerating & Air-Conditioning Engineers.

Frank is an engineer with the new products laboratories of Westinghouse Electric Corp. who has been working on measurement of parameters of thermoelectric materials for the past year and a half.

Wholly Owned Subsidiary

Form Ranco Controls, Canada, Ltd. To Manufacture Controls for Dominion

COLUMBUS, Ohio — Ranco Controls, Canada, Ltd., Toronto —a wholly owned subsidiary— will manufacture Ranco automatic control devices for sale throughout the Dominion, it was announced by A. M. Hoover, president of Ranco, Inc.

Initial plans call for the assembly of component parts for the Ranco Type "A" controls. Ultimate plans, however, will include the manufacture of additional controls to meet various Canadian requirements.

At the present time, Ranco's complete product line includes automatic control devices for refrigeration, air conditioning, heat pumps, home laundry, and automotive industries.

Officers of the newly-formed subsidiary are: A. M. Hoover, president; W. R. Opp and G. E. Downie, vice presidents; A. P. McDiarmid, secretary; A. H. Appleton, treasurer. Hoover, Opp, and McDiarmid will also serve on the new board of directors.

Facilities of Wilcolator (Canada) Ltd. will be utilized for the production of both Ranco and Wilcolator products. Ranco purchased the Wilcolator Co., Elizabeth, N. J. and Wilcolator (Canada) Ltd.

Other subsidiary plants operated by Ranco are in Scotland, Germany, and Italy. Affiliate plants are located in Northern Ireland and Australia.

Silver Shield Conference Set for Cleveland April 9

CLEVELAND — A Silver Shield dealers' conference will be held Saturday, April 9, at the Statler-Hilton hotel here, it was announced by the National Warm Air Heating & Air Conditioning Association.

This all-day session will be a continuance of the Silver Shield dealer meeting held in St. Louis during NWAHACA's convention.

"Purpose is for Indoor Comfort Bureau members from all parts of the nation to get together and discuss and compare notes on their experiences in organizing and operating Silver Shield programs," NWAHACA explained.

The program will be planned and conducted by the Silver Shield Dealers' Meeting Committee made up of officers from each Indoor Comfort Bureau.

Knoxville Dealers Get Silver Shield Story

KNOXVILLE, Tenn.—A presentation of the Silver Shield program of the National Warm Air Heating & Air Conditioning Association was made here recently with some 100 warm air heating dealer-contractors from the greater Knoxville area attending.

Arrangements for the meeting were made in cooperation with a local committee, headed by George H. Vanta, vice president of Fraker Heating & Equipment Co. Other members of the Silver Shield action committee are Jack W. Goans, Earl Graham, and Ralph Culvahouse, all members of the Knoxville Utilities Board.

Lake Air Shopping Center To Have Conditioned Mall

WACO, Texas — Construction work is under way on the giant Lake Air Shopping Center on Bosque Blvd.

The $10 million project on a 243-acre site includes 210,000 sq. ft. of merchandising area opening into an air conditioned central mall.

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NLRB Raps Employer for Using 'No Contract, No Work' Threat

WASHINGTON, D. C. — A plumbing and heating contractors association recently discovered that employers risk National Labor Relations Board censure if they use the familiar "no contract, no work" threat employed by unions in bargaining.

The board found the Utah Plumbing & Heating Contractors Association, Salt Lake City, guilty of unfair labor practices for making that threat and then following it up with a lockout of employes. The decision is subject to court review.

When association negotiators rejected wage increase demands from four locals of the United Association of Plumbers & Pipefitters shortly before their two-year contract was to expire, the union members in turn voted down the association's counter proposal and authorized a strike.

The day before the contract was to expire, management gave union leaders a new offer, coupled with a threat that work would cease the next day if union negotiators refused assurance that they would try to persuade their members to accept the offer.

When union leaders gave no assurance, the companies locked their doors. Four days later, union members voted to accept the offer, ending the lockout.

The employers, when called before labor board officials on union charges, argued that contractors risk irreparable damage waiting for unions to strike without notice. Their lockout was only a defensive measure against their union threat.

But Trial Examiner William E. Spencer found this explanation "incredible." Management was aware, he said, that their better offer nullified the strike authorization, and when they threatened and then instituted a lockout, there was actually no strike threat.

"The threat of a lockout and the lockout itself were resorted to primarily not as an economic weapon necessitated by a strike hazard, but for the purpose of forcing a quick acceptance of the employer's contract proposals," Spencer declared.

Approving his findings, the labor board said the association had interefered with its employes' collective bargaining rights.

The association was ordered to stop threatening the employes with a shutdown or lockout "in order to force them to give up their bargaining demands and accept the respondent's contract proposals without further bargaining." And employes were also to be paid wages lost during the lockout.

UA Leaves AFL-CIO Industrial Dept. After Schoemann Tiff with Reuther

WASHINGTON, D. C. — The long-standing jurisdictional feud between craft and industrial unions in the AFL-CIO grew hotter last week as the United Association of Plumbers & Pipefitters left the federation's Industrial Union Dept.

The UA's action will not affect its affiliation with the parent AFL-CIO.

According to one report, the union's withdrawal was primarily the result of a recent personal clash between Peter T. Schoemann, UA president, and Walter Reuther, Auto Workers president who also heads the Industrial Union Dept.

As reported earlier in the NEWS, the clash occurred at a meeting that was held last month in Miami Beach of the AFL-CIO Executive Council.

At that time, Schoemann claimed he was virtually thrown out of a meeting of the department's executive committee on Reuther's orders. Denying this, Reuther said Schoemann was asked to leave only after the meeting was over so that a caucus could be held on another matter.

Schoemann gave notice of the UA's withdrawal from the Industrial Union Dept., of which he was a vice president, in a letter to James B. Carey, department secretary-treasurer.

Several other building trades unions—among them the sheet metal workers, operating engineers, carpenters, and iron workers—have left the department.

Judge Nixes Picketing For Work Assignment

BUFFALO — Federal Judge John O. Henderson ruled that Steamfitters Local 395 was picketing illegally at the site of the new plant of the Buffalo Milk Producers Co-operative Association Inc. in Cheektowaga.

He said the union's action resulted in a work stoppage and was aimed at forcing one of the subcontractors to hire union labor. This, he said, violates the National Labor Relations Act.

The judge ruled that the picketing was not for the purpose of organizing employes of Marshall Maintenance, Trenton, N. J., a subcontractor which is installing stainless steel piping at the plant.

He ruled that both the use of sign-carrying pickets and the handing out of leaflets declaring that Marshall is a non-union employer resulted in workers of other companies on the project leaving their jobs.

He noted that Marshall had only two non-union men assigned to the pipe-installing job. Because the union's action was to compel assignment of work to its members rather than to organize Marshall employes, the judge said its actions constitute an unfair labor practice.

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Chrysler Airtemp Team Bats $10 Million In Spring 'Opener'

TAKING TIME OUT from a record business day which brought in more than $10 million in air conditioning equipment orders are hard-hitting Chrysler Airtemp sales executives: (l. to r.) Rowe Greenway, Lou Barron, George Godfrey, Ralph Link, Joseph B. Ogden, Paul Augenstein, Warren Fitch, and F. G. Hill.

Nine-Week Slugfest Cooling Promotion Starts with Company's Biggest Sales Day

DAYTON — Chrysler Corp.'s Airtemp Div. opened a nine-week Spring Slugfest promotion on March 21 with the biggest sales day in the history of the air conditioning industry, according to company officials.

With the offices decorated on a baseball theme, complete with dugouts, concession stands, balloons, bats, and baseballs, 17 Chrysler district managers turned in orders for $10,100,000 in a 10-hour effort—more than a million dollars an hour.

Vice President of Sales Joseph B. Ogden, said employes in the Chrysler shipping department had been placed on overtime in an effort to transport the $10 million-plus in orders within the 30-day period.

President Paul M. Augenstein praised the team effort which got the Spring Slugfest off to its rocket start. "This offers conclusive proof not only of confidence in Chrysler Airtemp, but of the distributors' faith in business conditions in their respective markets," Augenstein stated.

Ogden lauded the efforts of the district managers who placed more than 450 long distance telephone calls during the day and he conplimented them on their salesmanship.

Each district manager wore a baseball cap and shirt and received a duffel bag which contained 20 items pertaining to baseball. Scoreboards were located through the office and plant. Each hour they were posted with the latest sales figures and in the plant the dollar value was converted into hours of production work. The 10 million dollar total represented 33,856 man hours for the more than 2,000 Chrysler Airtemp employes in Dayton.

Chrysler's previous sales record for a single day was more than 3 million dollars set in 1959 on St. Patrick's day.

The Spring Slugfest consists of two contests, one for room air conditioning distributors and one for packaged heating and cooling. Each contest is made up of teams in two leagues and the contests are broken down into three two-week periods and a World Series. Prizes will be on a team basis.

At the end of the first two weeks, the wife of each distributor on the winning team in each of the four leagues will get a diamond solitaire or cultured pearl necklace. At the completion of the second phase, each distributor on the winning teams will get a white gold wrist watch with six diamonds.

The third two-week period winners will qualify for the World Series, which will have as first prize, dude ranch trips for each distributor and top dealer plus their wives. Movie cameras and projectors will go to the runners-up.

L. A. Code--

(Continued from Page 1, Col. 3)

motor protective devices, and the like.

"2. The unit shall be specifically designed for this type of installation, and the entire unit shall be capable of being readily removed or replaced.

"3. A working space of not less than 3 ft. in height with a solid flooring extending not less than 2 ft. by 2½ ft. horizontally shall be provided at each unit.

"4. An unobstructed passageway not less than 3 ft. in height with a solid floor not less than 2 ft. in width shall be provided for access to the work space.

"5. Access to the passageway shall be gained by means of a permanent ladder or stairway leading to an access opening not less than 30 in. in length and width."

ASHRAE Plans--

(Continued from Page 1, Col. 3)

these environmental problems. By concentrating on them our society could make some outstanding contributions."

Laboratory officials make the point that environmental research demands controlled conditions of a very particular nature, and also continuity in research activity and personnel. Such research, they contend, can best be done in a laboratory such as that operated by ASHRAE.

It is also emphasized that "environmental research" covers many areas other than the effects of temperature and humidity. Noise and odors are two other elements of "environment" on which research is and will be conducted.

'Increased Productivity' Seen as Benefit To Accrue from Research

There are many practical benefits that will accrue from environmental research, but one which quickly catches the eye is that which holds the promise of "increased productivity."

Jennings and his staff think their data may be refined so that an industrial concern or government agency could use it to fix that point at which an increase in productivity would justify the installation of air conditioning. They believe that this point, depending upon the circumstances, lies somewhere between one and three per cent. (Some government tests, done under good control conditions, indicated that air conditioning in an area in which workers were performing routine repetitive tasks such as filing, might produce a productivity increase in the order of nine per cent).

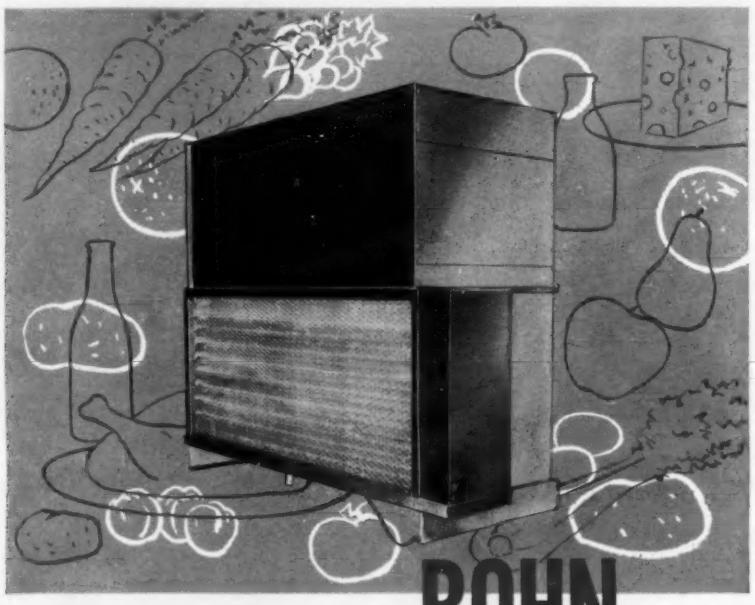
Effects on Capacity To Learn

Simultaneously with the productivity tests, the laboratory will be carrying on a similar type of program to measure the effects of environment on capacity to learn. "It may be that one of the reasons Johnny can't read is that he is sweating too much" someone has said.

This work is being carried on in the laboratory's Environmental Testing Center, an elaborately built, controlled, and instrumented structure located in the lab's main building. In it almost any set of conditions can be set up to check the reactions of subjects.

Studies May Result In Revising 'Comfort Chart'

Some of the studies now being undertaken may result in modifications of the widely used "Comfort Chart" developed by the society many years ago. The studies, being carried out in the Environmental Testing Center, concern the thermal radiation effects of a person's body to ceilings, walls, and floors which are at temperatures different from that of the air in the environment. The "Comfort Chart" was based on the subject's instantaneous response; that is, how he said he felt immediately after walking into a room having a different environment from the one he had just



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CAPACITY DATA

Model Number		BTU/Hr. 10° T. D.	CFM
*Vertical	Horizontal		
5800PCV-1	5800PCH-1	58,000	8,300
7500PCV-1	7500PCH-1	75,000	10,600
9200PCV-1	9200PCH-1	92,000	13,100

*Discharge ducts available for vertical models.

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left. In the contrast, the new studies are being based on how he says he feels after being in the room long enough to become acclimated.

The question of "just how much energy does the human body give off under varying conditions?" may sound academic. However, it's anything but that to the people working to put an American in orbit around the earth or on the moon. To these people the answer may mean the first step in designing the clothing and the vehicle in which that American is going to have to travel and live.

ASHRAE Built First Human Calorimeter In United States

To help take that first step, the ASHRAE Research Laboratory designed and built the first human calorimeter in the U. S. for the Navy. The Mercury Astronauts have all been tested in it. The lab is now designing another—this one for the University of Missouri—for animals, which will be able to accommodate such up to the size of a hog. A third one, large enough for cattle, is in the talking stage.

Purpose of Calorimeter

Purpose of these complex, expensive instruments (the Navy's cost about $160,000) is to measure how much heat a man (or animal) gives off or absorbs by convection, radiation, and sweating, through a range of temperature and humidities. "It also helps to tell us what a man can tolerate, both in heat and cold, under different kinds of stress," says Richard Huebscher, who has done much of the work on these calorimeters.

The "human" calorimeter is not the only one to which the laboratory is devoting time and attention. Fifty yards behind the main building on top of a concrete pillbox stands a solar calorimeter, used to measure solar heat gain under all kinds of conditions of weather, shade, angle to the sun, and other factors.

In charge of the "big black box" is Lester Schutrum. Presently measuring heat gains with such devices as plastic skylights, Schutrum describes his work as "primarily finding ways of reducing heat gain before it becomes part of the conditioning load."

Need Knowledge of Effects of Moving Air on Human Comfort

Despite the millions of fans, blowers, heaters, and air conditioners that have been designed and built, there is still much that needs to be known about the effects of moving air on human comfort. Studies planning by the ASHRAE laboratory will, it is hoped, yield more information on this important subject. These tests, to be started later this year, will cover a large range of temperatures and air velocities.

The lab hopes to measure and evaluate the relative effects of temperature and air velocity: Which is more important to comfort? How do subjects respond to changes in temperature and air speed? Is there anything like an ideal combination of the two for adding or taking away energy from the air?

William Kerka, the laboratory's specialist on air noises and odors, underscored the importance of the noise tests by pointing out that the commercial and military heating and air conditioning systems are now using air velocities in the 4,000 f.p.m. range. "In this range," says Kerka, "noise levels from air movement—above and beyond the noise level of the fan or blower—can be intolerable. This is extremely important in confined areas."

The Navy discovered this several years ago aboard its ships, and gave the laboratory a contract to find out what could be done about it. The laboratory, after exhaustive testing, came up with data which has proved very useful in minimizing noise levels from air movement. Certain aspects of this research are being continued.

Odor Research Centered Around Air Cleaning And Purification

The laboratory's work on odors is centered around air cleaning and purification. A pair of identical odor rooms, completely lined with porcelainized steel and built odor-tight, are served by an elaborate one-pass air circulation system which permits the introduction or extraction of fresh air, odors, or odor neutralizers in any desired saturation. The rooms are presently being used to measure the neutralizing effects of various filters and chemicals with cigarette odors.

Some of the other important areas in which ASHRAE plans to conduct research include: automatic controls for air systems; the relationship between high-level lighting, air conditioning, and heating for human comfort; ionization effects. These are all within the scope of environmental research, and designed to strengthen the society's research program by helping it to focus its activities on the area in which it is best suited to concentrate: the environment.

Or, in Prof. Jordan's words, " . . . help it to concentrate on environmental research, the one area in which the laboratory possesses outstanding facilities, and in which area the society in the past has always offered leadership."

Not only is ASHRAE planning to "firm up" its own Research Laboratory activities, but it is looking forward to continuing its cooperative research program. It is under this program that it makes grants to universities to study particular problems which are considered out of the scope of the Research Laboratory's program.

New Century Electric motor provides low-cost power for fans, blowers, pumps and compressors.

New Century Electric part-winding motor gives extra smooth start

This new motor . . . at either 1200 or 1800 rpm's . . . will give smooth, cushion acceleration. No cogging, jerking or jarring equipment. Just dependable starting power with the same reduction in starting current of all Century Electric part-winding motors. A special winding scheme makes this extra smooth start possible.

Applications—Have an application where power company restrictions limit inrush current? The complete line of Century Electric part-winding start motors may be the answer. They provide the most economical and dependable way of starting equipment such as fans, blowers, centrifugal pumps and compressors, as well as reciprocating compressors with unloading valves.

Reliable power—High quality construction features include . . . coils insulated with tough polyvinyl acetal resin . . . windings dipped and baked with several coats of high temperature synthetic varnish which protect against oil fumes, mild acids, dust and grit . . . rotors dynamically balanced so motors run smoothly and quietly . . . rugged cast iron frame for long life and low noise level. Century part-winding start motors are available in 20 to 150 hp sizes and in speeds of 1200 and 1800 rpm.

Application aid—A Century Electric application engineer will be glad to discuss your part-winding start problems with you. Century Electric also makes a complete line of motors . . . all sizes and types from 1/20 to 400 hp. For a copy of the new Century Electric Motor Application Guide, please write for bulletin 270A. For *more* than a motor . . .

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century 59-13

A 'Parts and Pieces' Story to a Homeowner?

(4) *Color Slide Film Projector and 'Rigor Mortis' Book Help Texas Salesman Get Full Profit on Jobs*

● How a "breakdown" method of selling residential air conditioning, using a "rig" or carrying kit containing parts of the system, together with photographs and drawings, has helped Arch Hughston become one of Texas' most successful air conditioning salesmen was told in previous instalments.

In this final instalment he explains how he does a further job of selling a quality job through the use of a color slide film projector, and also a special method he uses in handling the prospect who continues to object to the quoted price.

COLORED SLIDE film projector can have many uses in making a sales presentation on air conditioning to a homeowner, but Arch Hughston (left) finds it most effective in showing (1) examples of good installations made by the company he represents (2) contrasting badly installed and engineered installations which in many instances his company has been called in to correct.

There are two other "visual aids" in selling besides the "rig" or carrying case fitted with parts, which Arch Hughston has found useful in selling residential air conditioning.

These are a slide film projector which is used to project colored pictures of installations, and a "Rigor Mortis" book—nature of which will be explained. Hughston finds both of these useful in getting a satisfactory price for a job.

Projector Helps Show Quality Installation

"The easy-to-carry projector," says Hughston, "I use in showing the prospect some of the jobs that we have installed, emphasizing the neatness of the installation, the pride that we take in our work. It is also helpful in giving them an idea of what the 'finished product' will look like.

"By taking pictures during the various stages in the installation of some previous job, you can show how care is taken in installing and insulating ductwork, how refrigerant lines are run and insulated, how the various parts are fitted in and concealed so that the appearance of the house is hardly affected in any way.

Uses Some Pictures Of Poor Jobs

"Then I also have some pictures of some bad installations —often ones that our company has been called in to correct. With these I can point out examples of bad engineering, as well as poor workmanship. And I can bring home to the prospect the contrast between these bad jobs, and the good installations made by our company.

Who Is Going To Get Job Is Major Question Left

"Showing these pictures with the slide projector brings me to a key point in the selling job I'm trying to do," Hughston relates. "By this time, I have a pretty good idea as to whether or not they are going to buy air conditioning. So the question boils down to 'who are they going to buy it from?'

"So that's about what I tell them at this point. 'If you're going to buy air conditioning,' I say, 'isn't about the most important thing which people you are going to trust?' When I ask them that question I look them straight in the eye and have a dead serious look on my face because I mean business.

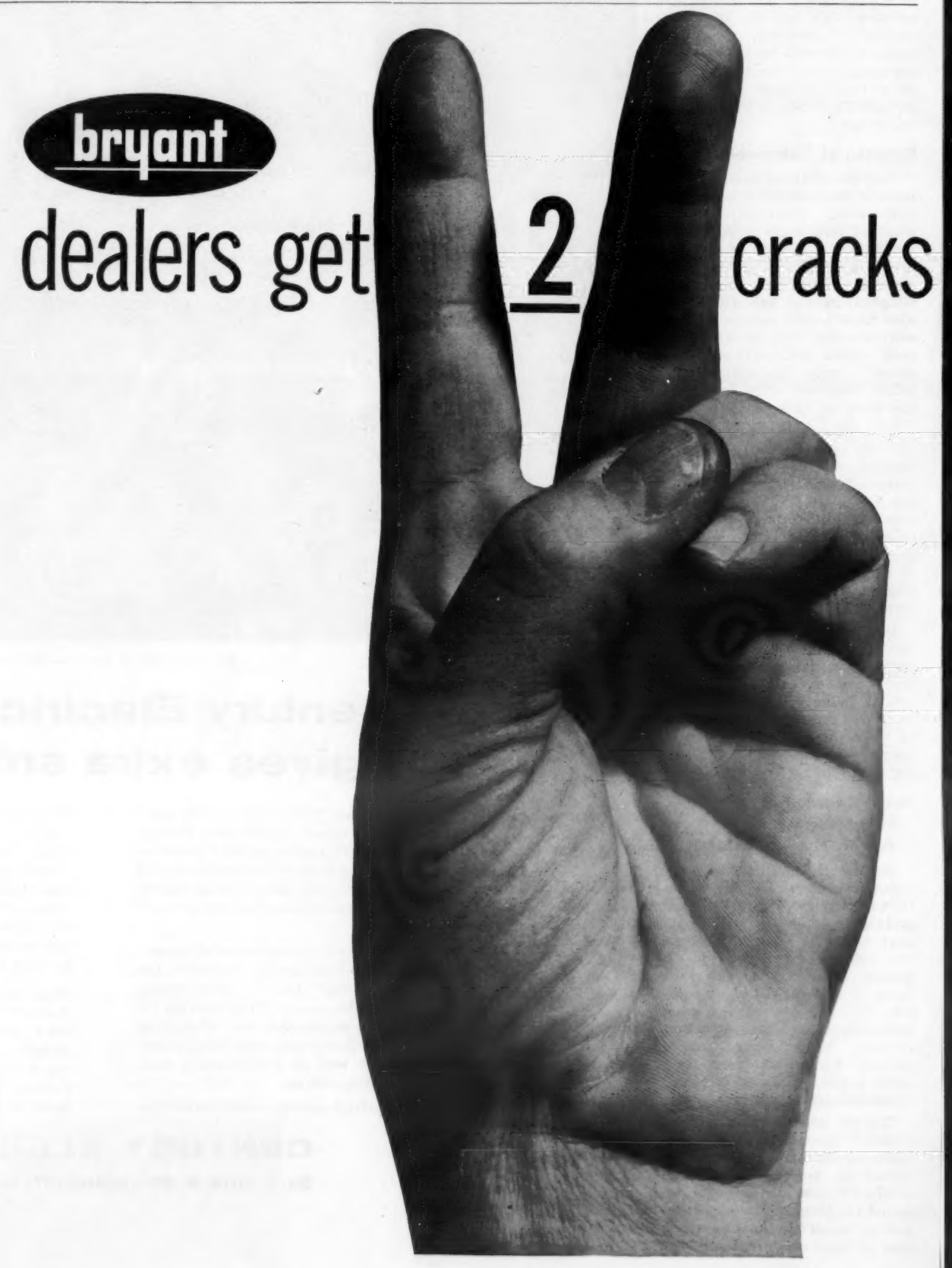
"Sometimes I see a startled look come across their faces because for the first time they realize what buying an air conditioning system amounts to. And this is the point where all my explanation of the workings of the system, my showing of the parts and pieces from the rig, and the colored slides of the installation, help me make the sale.

"If a prospect keeps resisting me on the matter of price, I'll sometimes bring out our cost estimation sheet and lay it in front of him. I'll show him exactly what the figures are on cost of equipment, cost of labor, charge for permits, cost of the warranty, all the actual costs on the job. Totaled up, these are the direct costs of putting in the job.

"Remainder of the price, I tell the prospect, is in overhead and profit. If the prospect is smart and reasonable, he will see that you have been honest with him in his dealings and that the only way that the price can be cut is either to leave something out of the job, or to cut the profit.

"If he asks me to cut the profit I pull out the 'Rigor Mortis' book, and I smile and say, 'Mister, if I do not make a profit on this job I could wind up in the 'Rigor Mortis' book, and I try to stay out of that.'

"He asks what the 'Rigor Mortis' book is and I explain to him that it is a previous year's telephone directory's yellow pages listing of air conditioning dealers who have died, so to speak, because of lack of profit.

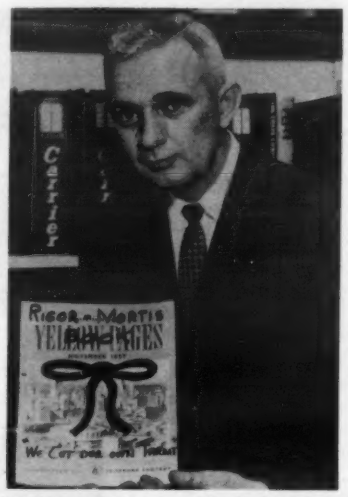


They did not make enough money and so they are no longer in the business and there are lots of orphans in the community that need somebody to take care of them. These orphans, of course, are the jobs these defunct companies installed and there is no longer anyone around to be responsible for or service these jobs.

"I only use the 'Rigor Mortis' book to throw off the prospects who keep arguing about price. Most of the time you have sold him with the rest of your story. You have explained how you are going to give him a quality installation, and you have been honest with the prospect and showed him your cost sheet.

"I consider the use of the kit as a 'hard sell' but not a high pressure method of selling. All I have to sell is air conditioning and I want to sell a quality job because I know a quality job will help me sell other jobs, and more than that, I get a kick out of fixing up people's homes so that they can be really comfortable in our hot Texas summers. I have to get my price to justify a quality job, and the 'rig' helps me do that.

"When I first started to use the 'rig' I had no idea what it might mean. The first four times I used it, I sold three jobs. And I have found since that it has raised the closing percentage on first calls quite significantly."



"RIGOR MORTIS" book is classified section of the telephone directory from previous years, containing names of air conditioning dealer-contractors no longer in business. Hughston uses it to counter objections to price, pointing out that defunct companies "cut their own throat" by cutting prices, and were thus forced out of business and leave "orphan" jobs.

One of Milwaukee's Oldest Re-Elects Officers

MILWAUKEE—The 75th annual meeting of one of the oldest trade associations in Milwaukee was held here.

Meeting at Volpano's restaurant, the Heating, Piping & Air Conditioning Contractors' Milwaukee association re-elected all officers, headed by Edwin W. Wenninger of Wenninger Co. as president.

'Guides for Business Analysis and Profit Evaluation' Issued by Government

WASHINGTON, D. C. — A study designed to encourage good business management by underscoring the importance of analyzing business operations through examination of accounting records has been issued by the Business and Defense Services Administration, U. S. Dept. of Commerce.

Prepared by the Office of Distribution of BDSA, a 76-page booklet, "Guides for Business Analysis and Profit Evaluation," discusses various management tools used in the analysis of accounting records, and provides the most comprehensive listing of financial studies currently available from both government and business sources, the announcement said.

Serving as a basic reference for all who analyze business operations of retail, wholesale, and service trade establishments, the publication is directed not only to those who must analyze business operations in managing a business, but also to accountants, bankers, credit men, appraisers, and others who must evaluate the operating performance of other businesses.

The booklet is available at 30 cents per copy from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Subscriptions may also be made through any of the 33 field offices of the Dept. of Commerce.

Hotpoint Appoints I. L. Griffin

CHICAGO—I. L. Griffin, formerly marketing manager, TV Receiver Dept., General Electric Co., Syracuse, has been appointed general manager, Refrigeration Dept., Hotpoint division.

Griffin replaces O. E. "Cub" Wolf, who will retire on June 1, 1960. Effective March 1, until his retirement, Wolf will become consultant to W. C. Wichman, vice president, General Electric Co., general manager, Hotpoint division.

Griffin has been with General Electric since 1947 when he enrolled in the company's business training course. In his new position, he will be responsible for all marketing, manufacturing, and administration of refrigerators, food freezers, and air conditioners.

Sayre Named Norge Board Chairman

CHICAGO—Election of Judson S. Sayre as chairman of the board and chief executive officer of the Norge Div. of Borg-Warner Corp. was announced by Roy C. Ingersoll and Robert S. Ingersoll, chairman and president of the corporation, respectively.

Sayre has been Norge president since May, 1954. Robert H. Quayle, Jr., executive vice president since October, 1958, succeeds Sayre in that post.

Simultaneously, Harold P. Bull was appointed vice president and assistant to the president. He has been vice president of sales.

Walter C. Fisher, director of marketing, becomes vice president of sales, succeeding Bull.

Bergeron Named

MIDLAND PARK, N. J.—Appointment of Paul O. Bergeron as sales manager of Federal Boiler Co. has been announced by James H. Legg, vice president of sales.

REPRINTS
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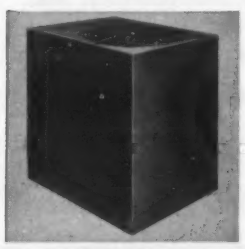
By Frank Klein—Only $1.00 ea. Clip this ad and mail with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort St., Detroit 26, Mich.

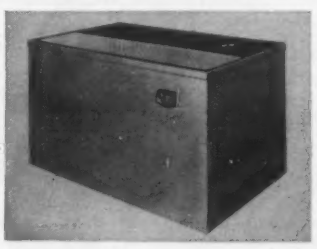
at the job...do you?

GAS AND ELECTRIC AIR CONDITIONING

Bryant dealers are in the best position to sell an air conditioning job —gas or electric. Almost unlimited coil and condenser combinations. They are backed up locally by factory-trained people on engineering, layout, supervision...and ABCC, Bryant's own financing plan.



GAS AIR CONDITIONING: The ONLY air-cooled, add-on gas unit designed specifically for present warm air systems. Ideal for new homes, too. Remote unit is easily installed. No special wiring required. Five-year warranty. Capacities: 36,000 and 54,000 B.T.U., A.R.I. Ratings.



ELECTRIC AIR CONDITIONING: Adds on easily to present warm air heating systems. Air-cooled, remote unit. Double cooling coils fit on top of furnace or in air ducts in basement, attic, crawl space. Five-year warranty. Capacities: 24,000 to 75,000 B.T.U., certified in accordance with A.R.I. 210-58.

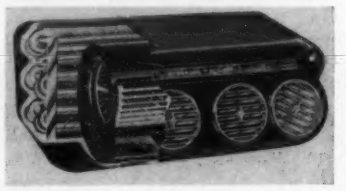
12 REASONS WHY YOU'RE AHEAD WITH BRYANT: 1. Most complete line. 2. Exclusive features you can sell. 3. Fast delivery. 4. Most flexible financing and credit assistance. 5. On-the-spot counsel. 6. Sales and technical training. 7. Business management guidance. 8. Local ad campaigns. 9. Sound selling policies. 10. Bryant's national reputation. 11. Gas air conditioning. 12. Bryant's financial strength.

bryant

Bryant Manufacturing Company, Indianapolis, Indiana
In Canada, Bryant Manufacturing Ltd., Toronto, Ontario

Frostemp Unit Recirculates Air Every 30 Seconds

1960 FROSTEMP auto air conditioner designed for Fiat 1100 and 1200 is shown at left. Compressor and cooling unit mount under the hood.



AN UNUSUAL cutaway shot of the Frostemp for '60 shows how the up-front double-inlet blowers draw air over the entire cooling fin surface. Plus, the air being directed through the exclusive underneath louvers for floor area cooling. Frostemp models are also available for foreign and economy cars such as the Falcon, Opel, Peugeot, and Valiant.

FORT WORTH, Texas — A new "Frostemp" automotive air conditioner designed to recirculate the air every 30 seconds has been announced by Lindustries, Inc. here.

Quiet up-front double-inlet blowers utilize every square inch of the cooling fin surface, according to the company. Two additional concealed louvers beneath the unit direct a gentle flow of air over the floor area, it was pointed out.

The compact Frostemp measures 6⅜ in. high, 15½ in. wide, and 11¼ in. from front to back. Its low profile styling uses none of the under-dash leg room, the company stated, and the rounded and softened corners add safety.

Mounting brackets are rubber mounted to cut vibration and are available in optional mounting bracket weld-nut locations.

A SLIM, compact air conditioner which can be installed in the field is now available for all late model Chrysler cars. The air conditioner was developed by Airtemp Div. engineers and is marketed by the MoPar Div. The air conditioner features quiet operation and rapid decrease of temperature besides its small size.

AIRTEMP has developed ¼-in. tubes in the evaporator coil used in the "Cool-Aire" automobile air conditioner. Paul W. Wyckoff, (l.) chief engineer and director of products at Airtemp, and Richard W. Gilmer, product development supervisor of room and automotive air conditioners, display the evaporator coil beside the complete unit.

* * *

Compact Conditioner For Field Installation Developed for Chrysler

DAYTON—Engineers at Airtemp Div. of Chrysler Corp. have developed a compact car air conditioner which can be installed in the field.

Slim in appearance and styled to match the car interiors, the unit employs an evaporator coil with quarter inch copper tubes and aluminum fins spaced 13 to the inch.

Paul W. Wyckoff, chief engineer and director of products, emphasized that the trick is to miniaturize size without miniaturizing performance. The compact Chrysler evaporator coil, in combination with twin blowers, cools the car on a 110°-day to comfortable temperature within seven minutes, it is claimed.

The unit is marketed by the MoPar Div. of Chrysler under the trade name "Cool-Aire" and can be quickly installed in any recent Chrysler made automobile, it was stated.

According to Wyckoff, the Cool-Aire unit will deliver 240 c.f.m. for good air mixing throughout the car. Yet, "It's as quiet as the factory installed heater system," Wyckoff stated.

A four-way control of air direction assures excellent cool air distribution to the back seat, the announcement said.

Car Cooling In E. Africa

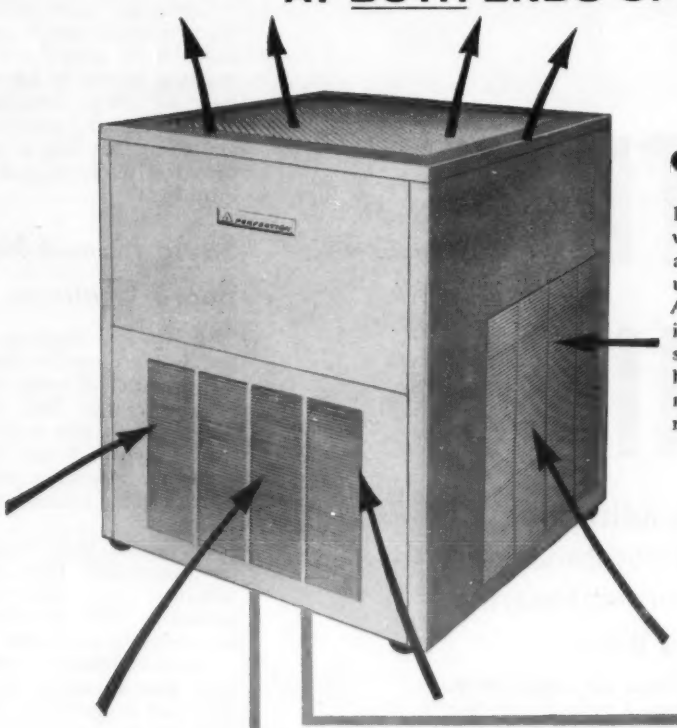
DETROIT—The Rootes Group is making available in East Africa an air conditioner for its Hillman Minx and Sunbeam Rapier cars, it has been reported.

PERFECTION

REMOTE

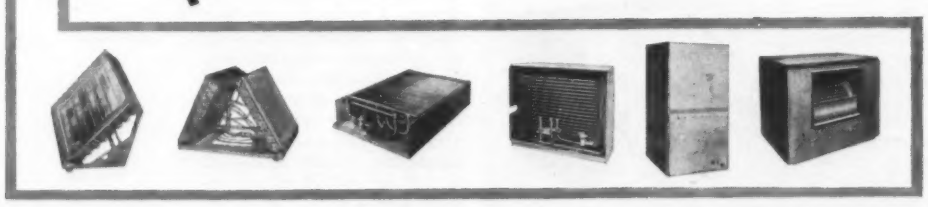
AIR CONDITIONERS EASIEST TO INSTALL...

AT BOTH ENDS OF THE LINE



OUTSIDE

Locate the remote condensing unit wherever you want it. Perfection's exclusive direct upflow air movement exhausts air from the *top* of the unit, where it won't hurt nearby grass or shrubs. And the big, belt-driven fan is whisper-quiet in operation — no noise problem. Complete selection of sizes in the popular two through five horsepower size range — a single unit handles most jobs, or combine them for larger commercial requirements.



INSIDE

Nothing makes an installation easier than having exactly the right inside components to fit the job. And you have them when you use Perfection. "A" coils, angle coils, flat coils, coil and blower combinations —anything you need for any job, for use with a warm air furnace or independently.

BE A PERFECTIONIST!

See your nearby Perfection distributor for full information on the complete Perfection line — air conditioners, heat pumps; gas, oil and electric warm air furnaces. Ask him for the free booklet "How to become a PERFECTIONIST." If you don't know him, ask us for his name.

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CHICAGO 5, ILLINOIS

Bryant Tells Dealers

Quality Helped Us Surpass Industry Growth In Heating and Cooling

DETROIT—"We doubled our electric air conditioning sales while the industry grew 40%; we increased our heating sales 36% while the industry rose 29%."

These 1959 accomplishments were relayed to some 200 Bryant Mfg. Co. dealers here by Dave Hoppock, vice president and general sales manager of the Indianapolis firm. The Detroit meeting was the thirtieth and last of a series of such meetings attended by more than 4,000 dealers, Hoppock told the NEWS.

"Simplified design, ease of service, a more efficient condensing unit" were factors in the growth of Bryant's electric air conditioning sales, Hoppock said. "Coated interchangers, infinitely adjustable gas, and styling" were the contributing factors in heating sales. "We think it is significant that 40% of our heating sales are deluxe models which cost more than the builder's models," he continued.

A key point in the dealer meeting was an explanation by Gilbert Peck, manager of branch operations of Bryant's affiliated Appliance Buyers Credit Corp., designed to help the dealer close sales with several dealer plans and consumer finance plans. Among the dealer plans offered by ABCC:

Inventory financing plan — "enables dealers to carry stock they need for both display and immediate installation";

Trade acceptance plan — "defers payment when merchandise is delivered to the job site. It allows the movement of equipment on sales made for installation in new construction";

Operating display plan—"designed to stimulate sales by financing equipment that is to be installed and operated as a working display in the dealer's home or store."

Several plans are available for consumer finance:

Property improvement plan—"helps develop sales in the modernization and replacement market";

Skip payment plan — "designed to encourage customers to install heating and air conditioning equipment during off-season periods";

Commercial installation plan —"offers the flexibility often required to close the sale of equipment to those larger commercial and industrial prospects. Labor and installation costs, as well as necessary related equipment, may also be financed under this plan";

Profit and pay plan—"especially designed to permit commercial and industrial users of heating and air conditioning equipment to make payments as they gain additional profits through higher employe productivity and greater customer comfort from controlled temperatures.

"This plan helps keep sales steady throughout the entire year";

Residential work-in-process plan — "Keeps your working capital working by relieving you of carrying the investment in equipment, materials, and labor during the period of installation.

"Plan is applicable to both cash and instalment sales";

Commercial work-in-process plan—"Provides the same benefits as the preceding for commercial and industrial installations";

Lease plan — "Designed for large, well financed commercial and industrial customers who prefer to lease, rather than purchase air conditioning and heating equipment."

'Heating Snowballs In Georgia' To Be EEI Talk Topic at April 4-6 Conference

CHICAGO — "Heating Snowballs in Georgia" is the intriguing title of one of the talks to be given at the Edison Electric Institute's 26th annual sales conference here April 4-6 at the Edgewater Beach hotel.

The "snowball" talk on electrically heating large commercial buildings will be given for the Commercial Sales Group meeting Tuesday afternoon, April 5, by Joe B. Browder, general sales manager and assistant to the sales vice president, Georgia Power Co.

Other sessions announced in the preliminary program include those for the Residential Group, with chairman R. G. MacDonald presiding, and the Industrial Power and Heating Group under the chairmanship of Paul W. McCormick.

At the latter session, there will be four talks, including one by Arthur C. Barr entitled "The Impact of the New Lighting Levels on Cooling and Heating Needs." Barr represents the Large Lamp Dept., General Electric Co.

Two general sessions will be held in the hotel's grand ballroom to explore the "All Electric Concept" and for general talks on: sales, advertising and motivation research, and the "Live Better Electrically" program for 1961.

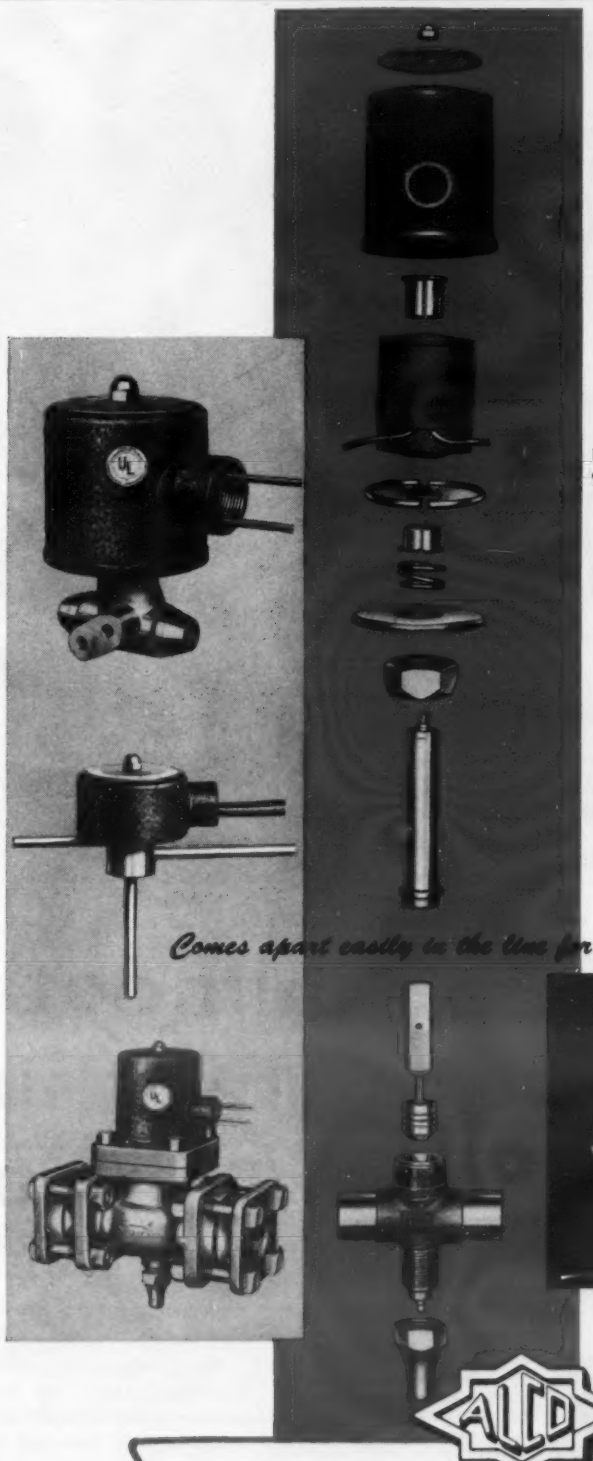
NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

NRMA Plans Parley on Dehumidifier Markets At April 6-7 Meeting

NEW YORK CITY—As part of the National Retail Merchants Association's plan to emphasize major appliances at its 6th annual Home Furnishings Conference, "Dehumidifiers: The Big Market is Ahead" will be the topic discussed by F. E. Moquin, national sales manager for Westinghouse dehumidifiers.

The conference will be held April 6-7 at the Biltmore hotel here, with morning sessions meeting at 10 o'clock and afternoon sessions at 2:30.

Also slated to speak are Homer Travis, vice president in charge of sales, Kelvinator Div., American Motors Corp.; Robert I. Pearce, national sales manager for Amana Refrigeration, Inc.; and Mason Smith, vice president, Whirlpool Corp.



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Inside Dope

By GEORGE F. TAUBENECK

(Continued from Page 1)

people he loved so much, and to their posterity:

"I place economy among the first and most important virtues, and public debt as the greatest of dangers, to pursue our independence. We must not load ourselves with perpetual debt.

"We must make our choice between economy and liberty, or profusion and servitude. If we can prevent the government from wasting the labors of our people under the pretense of caring for them, they will be happy.

"The same prudence which in private life would forbid our paying our money for extravagant — even if desirable — projects, forbids it in the use of public money."

Can You Top This?

What is an educated man? Over the centuries scholars have pondered this question. Solutions still are being sought.

G. K. Saiyidain, Secretary of the Ministry of Education in India, poses three test questions as a formula for determining "what is" an educated man: (1) Can you entertain an idea? (2) Can you entertain the other fellow? (3) Can you entertain yourself?

He feels that a school which turns out students who can supply affirmative answers to all three questions can pride itself on being a highroad to personal education.

Out of Our Mailbag

Phoenix, Ariz.

Editor:

Certainly your many peregrinations have taken you to fabulous Phoenix. But, if you haven't been here in the past seven or eight years, you have to rely on hearsay. So I will give you as good an accumulation of hearsay as you can get any place.

This is a frontier town—in spite of the swimming pools, the Thunderbirds, and the French cuisine. A few miles out of town are the Indian reservations, deserts vast enough to scare you—and deep snow country.

But all of that is fast disappearing—losing out to the subdivider and the subsidy farmer —now that there is an ample supply of water.

Arizona has its own unlimited supply of cement and aggregate to build the big dams. When we accumulate enough of those we can use the same stuff to build the homes and the pools and the public buildings.

The "sooners" are home building. I figure that they make their profit, not on the building itself, but on improving desert land which they bought yesterday for $50 an acre and figure in their selling price at somewhere about $1,800 in the typical tract dwelling.

For the-sky-is-the-limit buyer there is the mountain site and they have built some darbs. So far the speculators have profited mostly on each other.

But with Motorola, Sperry, Goodyear, Airesearch and others coming in—as well as a huge Federal payroll—I think the best is yet to come, because oil discoveries are showing up in the northeast corner of the state.

The chemical industry soon will discover that noxious gas rises straight up, and floats out over the Pacific.

All we need is the manpower which is coming here for reasons of health, happy memory from GI days and just to get the hell out of the sinus belt.

Arizon's traditional economy lives in numbered days. The cotton, citrus, ranching, and mining can't afford to operate on land which now has higher utility as home sites.

Even mining—the town of Jerome, founded by the Lewis W. Douglas family—still has low grade copper left . . . but is otherwise a ghost town. An artist's colony there has made it an attractive place which will have its tourist boom one of these days.

Being a midwesterner, I am disappointed in the athletic whirl in these parts. Baseball will have no representative here in the Pacific Coast League next year in spite of having contributed Orlando Cepada, Willie McCovey, and a re-tread in a guy whose name escapes me—he broke up a Dodger series a few years ago, outfielder from the hill country.

It is just too damned hot even in the evenings to move away from a swimming pool or air conditioner to watch a ball game in the lowest part of Our Valley of the Sun where—if there is any humidity—that's where it will be.

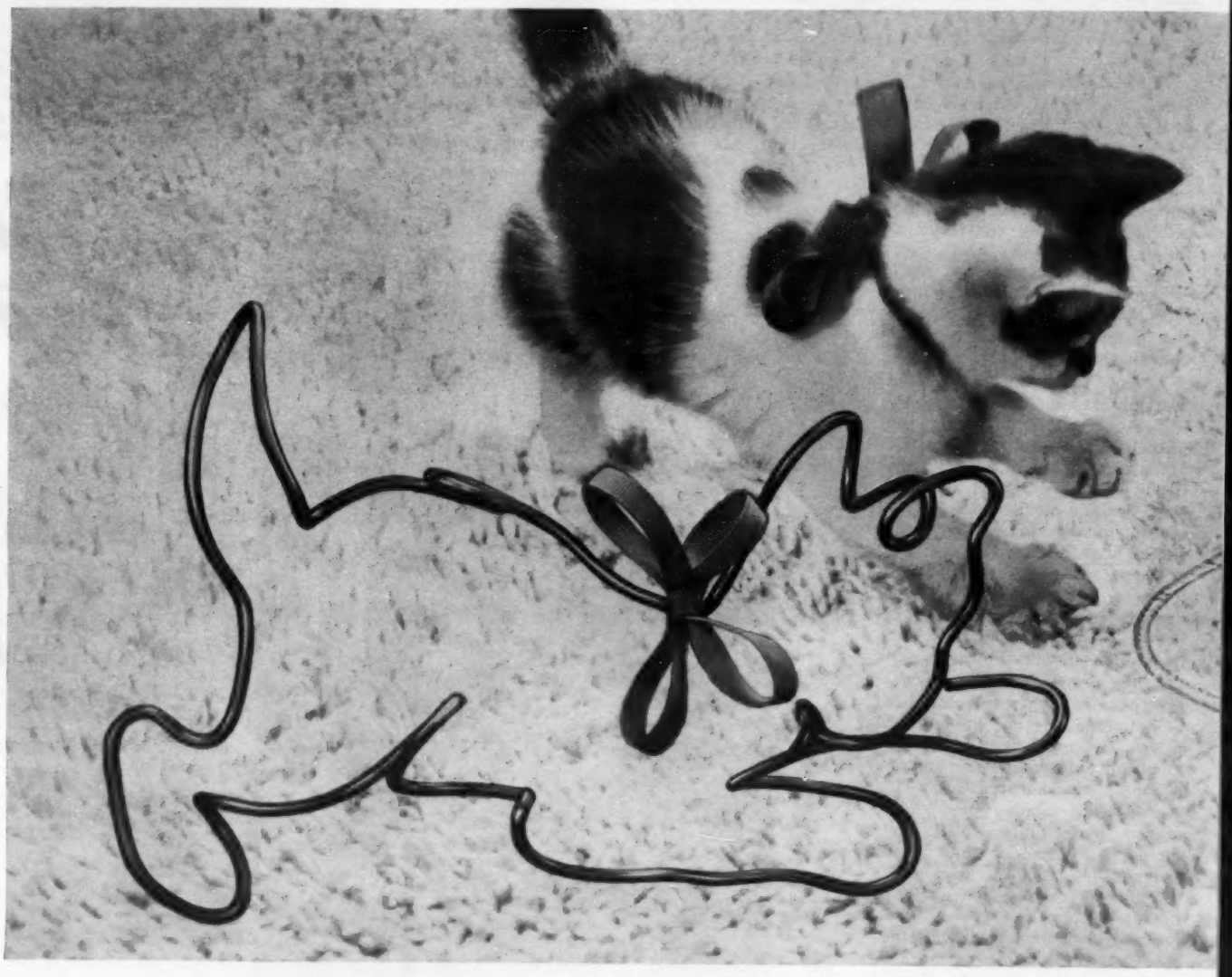
Football here is not Big Ten calibre—John Henry Johnson is the local Paul Bunyan — but with that you have said it all.

Golf is wonderful, however, mainly because of the scenery and the Bermuda grass which gives you a terrific lie for an iron shot which explains why the boys score so well in the Southwest. Tennis, too, is high in favor, and this may well be the hatchery for future Davis Cup people.

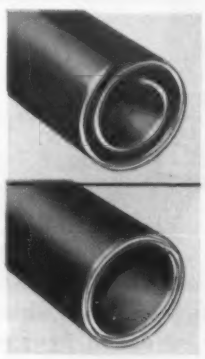
Whatever else we may say about Arizona, *we love it.* The great variety of scenery, ease of living, and vitality of the place appeal to us.

As far as business is concerned, this little whaling station is going better than I had any right to expect.

We swim a lot, do a little quiet drinking, enjoy our food (and the supply locally and from southern California is



There's almost no limit to the things Bundy can mass-fabricate



Bundyweld is the original tubing double-walled from a single copper-plated *steel* strip, metallurgically bonded through 360° of wall contact for amazing strength, versatility.

Bundyweld is lightweight, uniformly smooth, easily fabricated. It's remarkably resistant to vibration fatigue; has unusually high bursting strength. Sizes up to ⅝" O.D.

Experience makes the difference! Whatever your tubing problem, Bundy has the "know how" to mass-fabricate the shape you need.

Bundy engineers, working with you, may be able to suggest design modifications to cut fabrication costs. Then your design will be turned over to Bundy specialists who can mass-fabricate your tubing component at low unit cost with Bundyweld®.

Bundyweld is the original steel tubing that's *double-walled* from a single steel strip for extra strength and resistance to vibration fatigue. It's the safety standard of the refrigeration industry. Bundyweld is covered by ASTM-254 and Govt. Spec. MIL-T-3520, Type III.

Got a tubing problem? Bring it to Bundy. Call, write, or wire: Bundy Tubing Company, Detroit 14, Michigan.

WORLD'S LARGEST PRODUCER OF REFRIGERATION TUBING

fine) and feel great. We have made a few friends, but our various enterprises don't give us a lot of time for the social kick which is also typical of Arizona.

R. S. MATHEWS

Stories of the Week

Fittingly, Nathaniel Benchley's biography of his father recaptures the raptures of the late-sainted Robert Benchley's pixie humor. Bob Benchley seldom was topped. One exception:

Not long after Charles Lindbergh flew the Atlantic—solo—and was receiving greater public acclaim than Caesar and Napoleon in tandem, Bob wired his friend Charles Brackett in Paris.

"ANY TIDINGS OF LINDBERGH? LEFT HERE DAYS AGO. AM WORRIED."

Brackett's reply:

"DO YOU MEAN GEORGE LINDBERGH?"

Windy and discursive, lawyer for the opposition bored a jury for an hour and a half. Then Abe Lincoln arose.

"Your honor," he addressed the judge, "I shall follow the example of my worthy opponent, and submit my case without argument."

Quotes of the Week

A real great man is known by three signs—generosity in the design, humility in the execution, and moderation in success. —*Church of Jesus Christ of Latter-day Saints Bulletin.*

For most men in public life fame is achieved by slow stages. There are rings of growth, each one large in circumference, until finally the circle encompasses the nation and the world. A man and his time come gradually to an understanding. — MARQUIS CHILDS.

All of us can give friendship to those who need it; loyalty to those who depend upon us; courtesy to all those with whom we come in contact; kindness to those whose paths may cross ours; understanding to those whose views may not be in accord with our own. — CARL HOLMES.

We believe that every business situation, in common with all other forms of human endeavor, inevitably involves conflicts of values among the men concerned. Wherever possible, men must strive with good will for an integration of these divergent values. even though that integration may involve compromises which frustrate the individual because what he sees as right varies so sharply from what he realizes is attainable. Men must also be willing to face the tensions that result from these conflicts which prove irreconcilable, knowing that these tensions, too, are part of God's process.—*Harvard Business Review.*

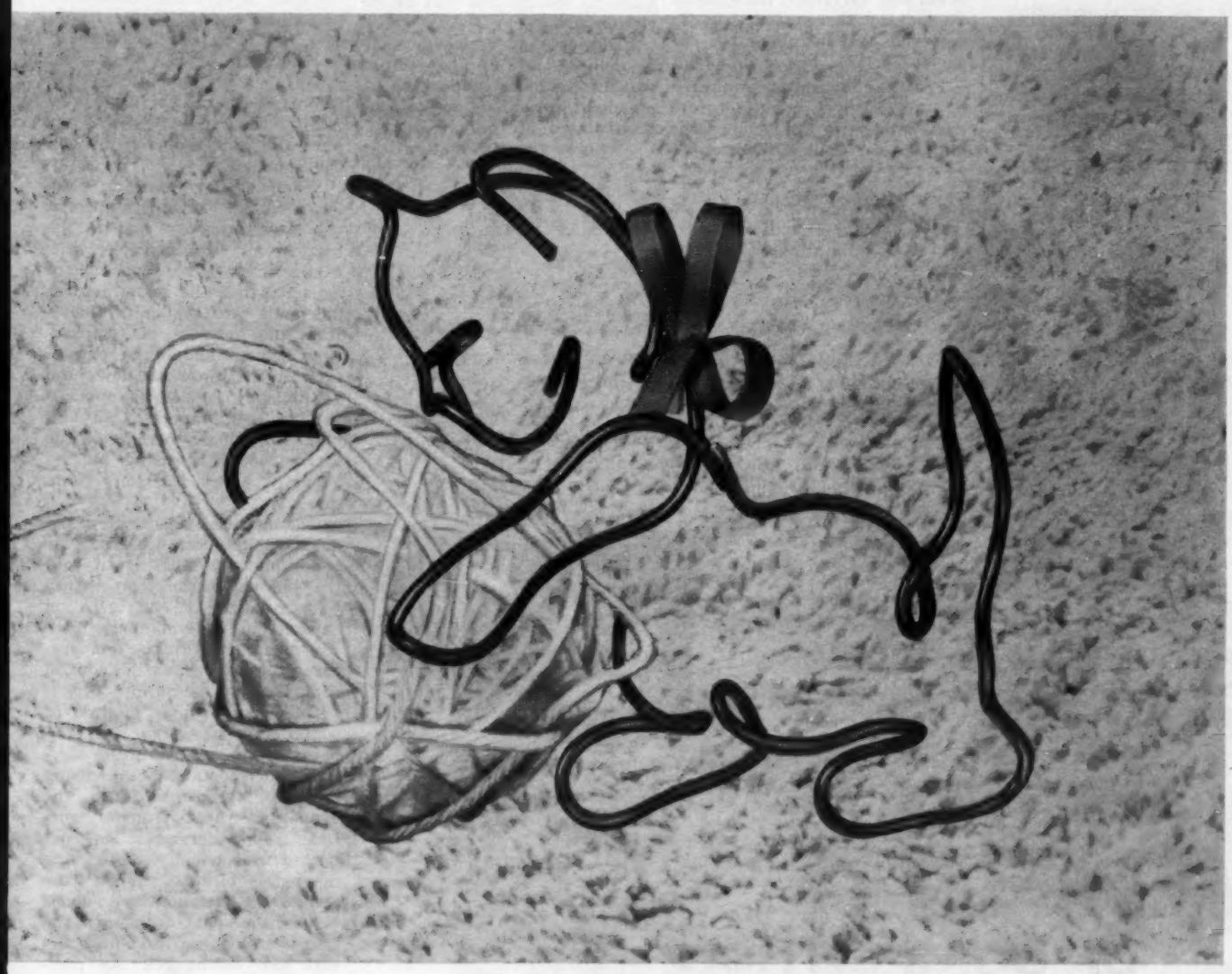
A foolish man may be known by six things: Anger without cause, speech without profit, change without progress, inquiry without object, putting trust in a stranger, and mistaking friends for foes.—*Arabian Proverb.*

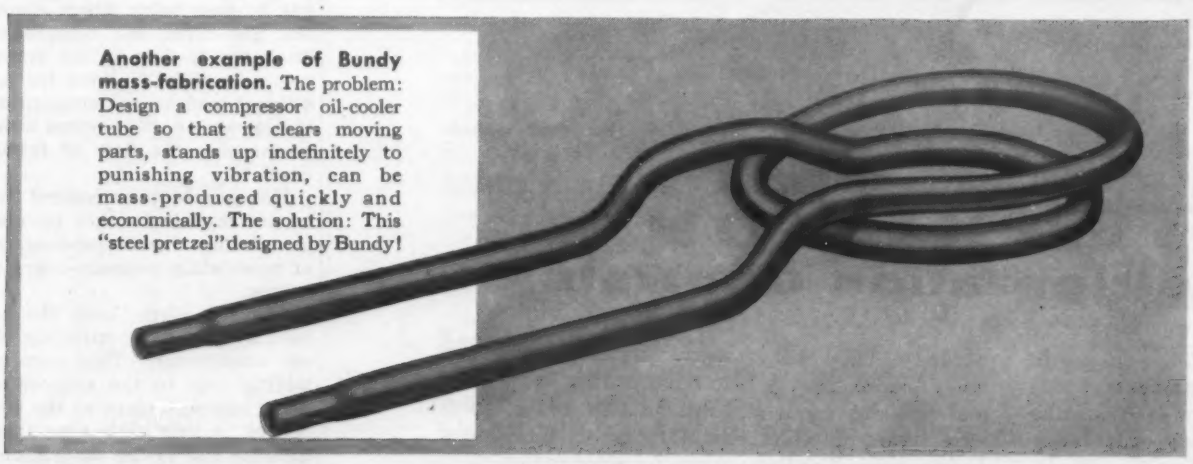
Science gives us knowledge, but only philosophy can give us wisdom.—WILL DURANT.

A girl may be easier to raise than a boy, but she's also harder to get rid of.—DAN BENNETT.

Life today is like a round of golf; as soon as we get out of one hole, we head for another.—MAURICE SEITTER.

A supermarket is a place where you can find anything you want except the kids when you're ready to leave.





Another example of Bundy mass-fabrication. The problem: Design a compressor oil-cooler tube so that it clears moving parts, stands up indefinitely to punishing vibration, can be mass-produced quickly and economically. The solution: This "steel pretzel" designed by Bundy!

There's no substitute for the original

BUNDYWELD® TUBING

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, BRAZIL, ENGLAND, FRANCE, GERMANY, AND ITALY

BUNDY TUBING COMPANY • DETROIT 14, MICH. • WINCHESTER, KY. • HOMETOWN, PA.

McQuay Opens Addition to Southern Plant

GRENADA, Miss. — Officers and directors of McQuay, Inc. joined civic and business leaders here at the formal opening of the company's new 63,000-sq. ft. addition to its southern plant on March 14.

Directors of the company also held their regular quarterly meeting here at the same time.

McQuay opened its Grenada plant in October, 1955. When originally built, the factory had 173,000 sq. ft. of space. This addition gives the plant a total of 236,000 sq. ft.

In the last two years, McQuay has increased the combined capacity of its plants here and in Faribault, Minn., by 67%. A 40,000-sq. ft. addition to the Faribault plant was completed last December.

"Last year the plant here produced heat transfer coils, air handling units, and refrigeration products, as well as air conditioning, heating, and ventilating units valued at approximately $10,000,000," the company reported. "In its first full year of operation here, production amounted to approximately $4,500,000, while in 1958 the total was approximately $7,500,000. In a little over four years, Grenada production has more than doubled."

"Completion of this new addition to our Grenada plant marks an important step in our current expansion program," B. E. James, president, said. "We now employ in excess of 400 people in Grenada, and this total will be increased. Sales of our company's products have grown substantially, and we are confident this trend will continue. In 1959, consolidated gross shipments for McQuay exceeded $17,000,000, an increase of more than 28% over the 1958 figures."

Auto Air Conditioning Section

Presenting current thinking on subject by people in the know. Following pages cover operating costs, engineering views on control and air distribution, discussion of what happens to a car when air conditioning is added, 1959 sales figures, and new products.

Penny A Mile Pays Cooling Cost—Avis

BOSTON — "We estimate the cost per mile for those of our cars equipped with air conditioning is about one cent more than those without," the NEWS was told by Winston V. Morrow, Jr., executive vice president of Avis Rent-a-Car System here.

The cost includes additional gasoline, maintenance of the air conditioning unit, as well as the additional risk factor. "The last item comes about in collision cases where a front end accident often ruins or badly damages the air conditioner," Morrow said.

Avis has not noticed any actual affect of the air conditioner on the car's performance. "For our purposes, of course, we hope the customer never tries to find the top speed of one of our cars."

Avis has air conditioning in about 50% of its cars in Texas and Louisiana, in 33% of the cars in Kansas, Oklahoma, and New Mexico, and about 25% air conditioned cars in Missouri.

Two Engineers View Problems

During the recent celebration of SAE National Automobile Week, two papers were presented by members of the Society of Automotive Engineers which treated the many aspects of automobile air conditioning. "The Bodies In Which We Live," by William H. Jackson, Harrison Radiator Div., General Motors Corp., and "Controlling the Automotive Air Conditioner for Comfort," by J. T. Kreasky, Chrysler Corp., discussed the effect of design factors on occupant comfort.

These excerpts from the talks fit in well with the general discussion in this issue of automotive air conditioning.

Kreasky of Chrysler

Most drivers will operate the unit on the lowest air flow since they have a psychological feeling that higher blower speed reduces unit life and increases electrical power consumption. It would be best to operate the unit at higher air flow all the time to minimize temperature differentials throughout the car interior.

An increase in capacity of any one component will increase the capacities of all other components and, therefore, the system. Control of the system can be achieved by controlling the capacity of any one component.

Fresh air operation is offered by automotive manufacturers who integrate the evaporator into the car body. However, to make comfort levels more achievable under very severe ambient conditions, provision is made to operate the unit on recirculated air.

Field-installed units—generally consist of an evaporator package mounted under the instrument panel and operate on recirculated air only.

A poor air distribution can result in the loss of as much as 10° of the car interior temperature.

Under equilibrium conditions (after cool-down), the heat gain of a car body can be regarded as the sum of the heat gain resulting from temperature difference between the car body interior and the ambient air, plus the radiant energy from the sun.

When cooling the car body down under severe ambients, the driver makes use of the highest air flow possible, thus taking advantage of every bit of capacity that the manufacturer has built into the unit. **Therefore, the question of temperature control should be considered at the lower air flows and at highway speeds** as opposed to city traffic under high ambient conditions where again the driver would be using all the capacity which the unit could give.

One method of controlling the discharge temperature of the air conditioning system is to control the evaporator temperature by regulating the refrigeration capacity in some manner.

—most evaporator temperature controls have a control range of approximately 30°.

One very popular method of controlling the evaporator temperature makes use of an electrical thermostat whose sensing element is inserted into the evaporator heat transfer surface. The thermostat is connected electrically into the magnetic clutch. **When the evaporator temperature drops below the control point, the thermostat opens the clutch circuit and disengages the compressor.**

System capacity can also be controlled by means of a hot gas by-pass valve which allows hot gas from the compressor discharge to flow to the evaporator. In order to meet the additional load on the evaporator, the expansion valve opens wider to increase the flow of refrigerant.

Hot gas by-pass control can be accomplished either by nonmodulating thermostat-operated or modulating pressure-operated valves.

Chrysler Corp. uses the reheat system for controlling the air conditioner. This involves adding heat to the evaporator, using engine coolant as the heat source. A heat exchanger about half the size of the conventional heater core has sufficient capacity to afford the desired control range.

Since over 90% of cars produced contain a heater, a full-size heater core is used, and the air conditioning unit becomes a combination heater-air conditioner.

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A STEP AHEAD OF COMPETITION

KLIXON MOTOR STARTING RELAYS* . . . complete the combination required to start and protect compressor motor. Their positive action over a wide range of voltage and long life eliminates starting troubles.

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KLIXON Controls permit the compressor to operate safely at maximum capacity. They reduce costly service calls, repairs and replacements . . . help build product reputation and customer goodwill. Find out how you can provide greater product reliability by using KLIXON Refrigeration Controls. Write for information.

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Over 200,000,000 KLIXON Controls are in use in refrigerating and heating equipment.

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Of Cooling Auto Bodies

Jackson of Harrison

Since our work deals with a human in a 150-cu. ft. car body having wide expanses of glass that are cold in winter and hot in summer, the established effective temperature data is a poor yardstick to measure comfort in the automobile.

Tests show that during 0° to 70° operation, desirable heater outlet temperatures are 160° to 70°. **Maximum heat requirement is 25,000 B.t.u.h.**

Cars equipped with refrigeration provide air discharge temperatures from 40° to 70° during operation in 100° to 70° ambients. **Maximum cooling requirement is approximately 22,000 B.t.u.h.**

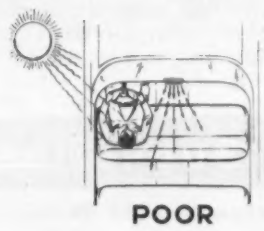
Refrigerated air velocities in the order of 1,500 f.p.m. provide evaporative cooling necessary to counteract human body heat gains due to radiation from the sun and warm internal car surfaces and to distribute air through the car.

Optimum air volumes for heating, ventilating, and air conditioning are 150 c.f.m., 500 c.f.m., and 250 c.f.m., respectively.

Depending on the efficiency of evaporator surface, discharge air into the car will vary from 90 to 95% R.H. This air mixes with the warmer air of the passenger compartment to provide a resultant 55-65% relative humidity.

Distribution of refrigerated air requires considerable flexibility to meet comfort requirements. The system must be capable of discharging cooled air to the laps, chest, and face of the passengers during early hot operation from a parked situation. As heat is lost from the body, and internal surfaces of the car, it is essential that the discharges can be adjusted to direct the high velocity air away from the body to continue cooling the car without overcooling local skin areas.

Air discharge from nozzles should be so arranged that the inboard side of the front seat passengers is not overcooled, while the outboard side is overheated by solar radiation.



POOR

GOOD

The man at the fireplace has the option to turn around and alternately warm both front and back; the driver of a car is confined to his position. A relatively small quantity of air should be delivered to the front floor of the car to provide foot cooling and to counteract the radiation of heat from the dash, toe pan, and floor pan to the lower legs and feet.

The ideal refrigeration system should be capable of operating on 100% outside air during moderate ambient conditions. Use of 100% recirculated air tends to cause eye smarting when excessive smoking occurs.

The use of 25% outside air with 75% recirculation tends to preserve good quality air in the car without affecting maximum cooling capacity.

Various types of insulation between the roof and head lining have been tried without conclusive results. It can only be summarized that roof insulation offers little advantage—floor insulation shows improvement on heating and up to 3° cooler in-car temperatures while cooling.

Clear glass transmits approximately 80% of available heat energy. A typical E-Z eye windshield reduces the transmittance to about 24% which is a measureable improvement to front seat occupants.

Based on tunnel and road tests, tinted and/or shaded glass offer up to 5° cooler in-car temperatures, in addition to reduced radiant load on occupants.

Air Conditioned School To Cost $1,900,000

HOUMA, La. — Construction is scheduled to begin in May on a 40-classroom, all air conditioned, ultra modern high school building on State highway 24, six miles south of here.

The new school will cost approximately $1,900,000.

Bigger Gas Engine Put on Truck Cab Unit

DALLAS—Climatic Air, auto and truck air conditioning equipment manufacturer, has announced improved 1960 models of its "Portamatic" truck unit available for immediate distribution.

An increased horsepower gasoline engine enables the unit to cool truck cabs in every kind of climatic condition, according to the company.

"The case for the unit can be mounted anywhere on the truck frame without perforating or damaging the cab," the company said. "It rides as a saddle type fuel tank or inside the truck bed on any convenient rest for rack holders—can be mounted without relation to truck movement as direction traveled does not affect operation. Evaporator fits in cab underdash, between seats, in sleeper bunk, or on floor, it was noted.

"The unit dehumidifies, keeping clothing and bedding dry and fresh. It cools continuously without strain on motor or battery even when truck is not in operation. Unit runs from its own fuel tank."

After 15 Years In The Making . . .

*FROSTEMP

Is Yours Distributor & Customer APPROVED!

For 15 years you have been designing an automotive air conditioner. Each time you expressed your opinion you drew another specification toward development of the ideal product.

Lindustries Engineers, who designed and built the first independent auto air conditioner in America, translated your opinions into design, engineering and production of the perfectly proportioned Frostemp for '60.

***The First Auto Air Conditioner Ever Designed By Public Opinion**

Frostemp was tested and accepted through a carefully selected group of Distributors from coast to coast! The amazing proof of Distributor and Customer approval is reflected in these unsolicited reports:

I think you have a terrific unit. *Illinois*

We are very pleased with the Frostemp unit. The public likes them very well. *Texas*

I like the way it installs, the controls and the way it cools quietly. I think you have one of the best units on the market. *So. Carolina*

Frostemp price and performance has placed us in a leading position in local Auto Air Conditioning. *California*

Names and addresses of these executives will be supplied by Lindustries!

Quietly Recirculates Air In 30 Seconds!

Powerful twin squirrel cage blowers are placed in front of the coil and pull air over the entire cooling fin surface. Frostemp cools, purifies, dehumidifies and recirculates the air in the average car every 30 seconds!

Economy Performer!

Rock-bottom in maintenance . . . And the standard of perfection in complete car coolability!

Exclusive Hidden Comfort!

Two additional concealed louvers diffuse a gentle flow of air over the floor area keeping it pleasantly cool. This new concept in complete car cooling eliminates uncomfortable concentrated streams of cold air characteristic of side louvers!

A Profitable Salesman!

Engineering perfection, beautiful styling, coast to coast advertising and free dealer aids make Frostemp for '60 your most profitable salesman! Price lists and other information, including information on Frostemp foreign and economy car units available now! All inquiries are confidential!

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Only One Authorized Distributor To Any Given Trade Area!

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by Jimmy Hatlo

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BUT AT HOME BASE HE'S A CHUMP FOR EVERY PEDDLER PITCHING ANYTHING FROM KAZOOS TO KUMQUATS---
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WOW! GIVE ME TEN OF THEM!!
1-20
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What the Customers Don't Know Won't Hurt Them?

AUTOMOBILE manufacturers apparently believe that there's virtue in mystery —especially where operating costs are concerned.

Almost without exception, attempts of NEWS investigators to discover what it costs to operate an auto air conditioner have met with rebuffs on the part of automotive officialdom.

Two estimators (one from an independent automotive air conditioning manufacturer, the other apparently befuddled) did respond.

Avis Rent-a-Car Service states that auto air conditioning costs only a penny a mile. This firm may have a surprise coming when its tots up such intravenous injections as extra gasoline burned, underabsorbed maintenance, and extra insurance required.

Estimator R. V. Anderson of John E. Mitchell Co. declares that the additional cost of driving a motor car equipped with air conditioning will run from four to 12 cents per hour at city-traffic speeds—and eight to 18 cents per hour on higher-speed intercity highways and turnpikes.

These estimates were tossed up for grabs to each of America's major automobile manufacturers. Purpose: criticism, comparison, corrections — THE TRUTH, in short.

Reactions varied from "no comment" to violent objections. Sample of the latter:

"We don't tell our customers how much effective horsepower is drained away by automatic transmissions, window-lifts, power-steering, etc. Why should we bring up air conditioning's extra operating costs?"

Aside from the business morality of this "what they don't know won't hurt them" attitude, experience indicates that whenever a new product is made mysterious, its progress is impeded.

Up until now, automotive air conditioning has enjoyed an unprecedentedly upward-zooming sales curve — with scant thanks to automobile manufacturers, who learned to appreciate its appeal belatedly. Despite automotive industry shortsightedness in this regard:

(a) Used cars equipped with air conditioning are in demand *at a premium* nowadays;

(b) Independent auto air conditioning manufacturers continue to enjoy excellent financial health by serving owners of two-three-four-years-old cars; and

(c) Far more factory-air-conditioned *new* gas buggies are *ordered* rather than *sold*.

So why all the secrecy about air conditioned transportation? Customers WANT it, and are willing to pay for its obvious benefits. Why, Mr. Ford, Mr. Colbert, Mr. Gordon — hide this "light" under a corporate bushel?

Just as nature abhors a vacuum, consumers don't like to be kept in the dark.

Without government aid or intervention, contractors erected houses at a higher rate 35 years ago than they could or did in the mid-1950's.

"Offhand," according to Dr. Emerson P. Schmidt, Director of Economic Research for the U. S. Chamber of Commerce, "this unfavorable showing for the government interventionist period causes one to wonder whether all this Congressional concern for housing was justified in the past 20 or 25 years, and whether its continuation in the future is wise."

Both mid-1920's and mid-1950's were prosperous years, Dr. Schmidt noted. Here are the figures that he presents in evidence:

Housing Starts - - With and Without Government Aid

Year	Non-Farm Housing Starts (Thousands)	Gross National Product (Billion Dollars) Current Prices	Gross National Product (Billion Dollars) 1954 Prices	Population (Thousands)	Housing Starts Per Million Dollars GNP 1954 Prices	Housing Starts Per Thousand Pop.
1925	937	94.5	161.8	115,832	5.79	8.09
1926	849	98.6	170.8	117,399	4.97	7.23
1955	1,329	397.5	392.7	165,270	3.38	8.04
1956	1,118	419.2	402.2	168,176	2.78	6.65

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F. M. COCKRELL, *Founder*

'The Conscience of the Industry'

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NCRSA SEES NEED FOR BETTER INSTALLATIONS

National Commercial Refrigerator Sales Assoc.
Philadelphia, Pa.

Editor:

Your recent articles on "Installation and Service Practices in Commercial Refrigeration" have been read with interest. You have effectively pointed to the "weak link" in the manufacturer-to-chain-sale of commercial refrigeration equipment.

"No equipment is better than the installation and service behind it" is the slogan of our Association — a truth which most direct purchasers of equipment have undoubtedly learned at some time through unhappy and costly experience.

To the question: "To whom can the chain operators look for proper installation, adequate servicing and dependable performance of the refrigerated equipment?" — our answer is, the *qualified Distributor*. If given the opportunity, he will sell and service the equipment locally, thus relieving the manufacturer as well as the chain store operator of many headaches, costly errors, and expensive personnel.

Qualified Distributors of equipment have the interest of *both* their manufacturer and customer in mind at all times. They are "food store engineers." Their services are many and include store planning and engineering, equipping the entire store with its refrigerated requirements and related equipment needs. They install equipment they regularly sell and are, therefore, familiar with the equipment and the manufacturer's recommendations with regard to installation.

It is because the Distributor is a local concern whose success depends on satisfied customers, that the chain operator can look to him for proper installation and good servicing when he

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(Continued)

buys equipment from the Distributor. Since each food store, regardless of its chain connection, is a local business, subject to local conditions and the habits of the people in the area, a great many of their difficulties could be eliminated by using the Distributor in each area in which their various stores are located.

The installation and servicing of the equipment would be well done, because the Distributor must give satisfaction to his local customers. He not only carries the responsibility for installation and servicing, but recommends and represents the Manufacturers, thus bearing a complete, over-all obligation.

If manufacturers want to be responsible for installations on direct purchases, as your second article mentions, they may find that they have greater costs and greater responsibility than they can assume. In the final analysis, the local Distributor's sales and service personnel can more effectively and more economically serve the food store chain customer at the local level.

Your articles have properly directed attention to this very vital problem — who is going to be responsible for first-rate installation and servicing on sales made direct. It is a question, we hope, to which all food store customers, chain or otherwise, will give serious thought.

MARIE H. LAWTON,
Executive Secretary

NO LABOR ALLOWANCE WITHOUT PRICE ADJUSTMENT UNJUST

John H. and Earl Hunter
Air Conditioning,
Home Appliances,
Commercial Refrigeration
Brownsville, Texas

Editor:

I am addressing this letter to you personally because I feel very strongly that, as a leader in the air conditioning industry, you should take a stand which would give some protection to the rank and file dealer. I am attaching a manufacturer's form letter which has been received by all his dealers; and I understand similar letters have been mailed by other manufacturers to their dealers.

When a manufacturer abandons a policy of standing part of the freight and labor allowances which have been recognized over a period of years, he should either announce it as a price advance or he should reduce his price equal to the reserve which has been charged in the past to cover the services which he is discontinuing, but the right is still his to do this.

However, to discontinue freight allowances and labor on items which have been sold to the dealer and, in turn, to the customer on that basis, is as unethical as it would be to sell the compressor with controls and motors and then remove the controls and motors after the sale was made.

The warranty which covers freight and labor allowances on a stated basis is as much a part of the package which we as dealers purchased from the manufacturer, and, in turn, sold to the user, as is the motor, control system, or, so far as that is concerned, the crating.

The proposal is so outrageously unfair that I cannot conceive of the manufacturers believing that the dealers and the general public would stand for it. For this reason I think a clear editorial in your paper condemning it would put a stop to it without the dealers having to resort to legal action, which we are prepared to undertake if the situation is not corrected.

If you don't feel like writing such an editorial in your paper, I would like to have your opinion on the whole situation.

JOHN H. HUNTER

WOULD CONDENSE, REPRINT EDITORIAL ON EXPORTS

Publishers Digest
Chicago, Ill.

Editor:

It seems to me that the views expressed in your editorial on the export market certainly deserves wider distribution than within your particular industry. If you have no objection, we would like to condense and reprint the editorial on world markets.

As always, full credit will be given to your publication and file copies will be sent after use.

ED BRENNER,
Editor

QUESTIONS GIVING LABOR COURT POWER TO ESTABLISH WAGE SCALES

Republic Electric Co.
Davenport, Iowa

Editor:

I wish to comment on your editorial, "Strikes, Like Wars, Are Senseless; Why Can't We Have Labor Courts?"

Congress is such a political body that it often fails to protect the people's interests. Certainly it has not protected them in allowing industry-wide bargaining where one man can shut down every steel mill in the country when he chooses.

The only danger I see to labor courts is I question whether or not they should have the power to set wage scales. This should be between the employer and the union. Possibly this could be overcome by a provision for court referral when they do not agree and the interests of the country are suffering.

Certainly the interests of the country itself as regards to inflation and control of domestic and foreign markets is sufficient reason for throwing it in court when partisans can't agree.

It would seem that the labor unions mean to dominate the country, and that is another reason also for taking action.

The connection between the unions and socialism is something to be thought about and pondered.

J. S. KIMMEL, SR.,
President

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

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AIR CONDITIONING • HEATING • REFRIGERATION

When Air Conditioning Is Added to a Car What Happens *to Horsepower, Mileage, Operating Costs?*

By Frank J. Versagi

What happens to a car when air conditioning is added? What is the effect on horsepower, mileage, operating cost? What about overheating?

The rapidly increasing use of automotive air conditioning is spotlighting these questions, and the answers do not all agree. Many engineers and technical people in the industry are willing to offer information only on the condition that they not be identified. To preclude accidental identification of any sources, the NEWS in this article refrains from acknowledging any interviewees. An exception is found in the article on page 18, wherein one authority in the field frankly discusses his feelings and knowledge of the general subject.

WIND TUNNEL tests at Ford Motor Co. reproduce many of the conditions encountered in actual driving. Here dozens of thermocouples at many locations in the car give technicians an accurate picture of the effectiveness of the car's air conditioning system.

"Actually, there is much ado about nothing," insists one source. "Sure, there is an effect on horsepower, on top speed, but that is the price you pay for comfort. You can't get something for nothing."

"Besides," adds another, "the practical effect of these factors is rather insignificant for the normal driver. When we say that adding an air conditioner takes 10 m.p.h. off the top speed, we mean that a car which can go 115 m.p.h. will only do 105 m.p.h. with the air conditioner connected. Who is going to complain about not being able to go 115 m.p.h.?"

"While I'll deny it if you quote me," adds a third source, "we would all have to admit that we used the customer as a guinea pig in the first days of automotive air conditioning. Actually, the quickest, most efficient way to test our ideas was to put them on cars and turn them loose under all conditions, with all kinds of drivers. We've learned a lot and our new units show the results of our increased knowledge."

But to get to the specific questions.

THE EFFECT ON THE CAR'S COOLING SYSTEM

Basically, overheating of the cooling system is caused by a lack of adequate condensing area or anything which produces an equivalent condition. It is a well known fact that at low speeds, the car equipped with air conditioning may heat above normal. (This assumes the air conditioner is coupled and being used; when uncoupled, the belt-driven pulley acts essentially as an idler and draws very little horsepower.)

"At low speeds, especially with stop-and-go driving, you are just not ramming enough air into the systems; condenser pressure and temperature rise making the conditioner incapable of performing adequately; water temperature goes up; the engine temperature rises." In extreme instances, the radiator may boil.

Almost unanimously, producers suggest these alternatives to solve the overheating problem at low speeds:

1. Fast idle—either manually or automatically speed the engine to get more air across the unit coils and the car radiator.

2. Shut off the air conditioner until you can resume normal driving speed.

Above 30 m.p.h., all makers agree, there is no trouble with overheating unless there is a defect in car design or in condenser design for the car to which the unit is applied. "If it is obvious that the condenser is too small for the job, some installers are recommending that the radiator be filled with anti-freeze solution to reduce considerably the overheating of the cooling system," states one maker. This practice is frowned upon by many.

As in all air-cooled air conditioning, it should be determined that the condenser, located in front of the radiator, is free of debris, bugs, and mud.

"There is great need for consumer education on this matter of engine temperature," suggests one authority. "The normal driver becomes concerned when the temperature gauge

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rises 10-15% higher than usual in regular driving. I believe most automotive engineers agree that, within reason and certainly within these limits, a warmer engine is more efficient than a cooler one, and lasts longer.

One or two instruction booklets issued with automotive air conditioners instruct the user to expect higher than normal engine temperatures when the conditioner is operating.

THE EFFECT ON CAR HORSEPOWER

This matter of horsepower consumption of an air conditioner is even hotter than that of overheating, and the available information is often contradictory. The data is significant because it bears directly on top speed and cost of operation.

One producer of automotive air conditioners states, "The car horsepower required for an air conditioner installed in the average American car is 5 hp. until the car is in actual motion, then the requirement is about 3 hp. (at 65 m.p.h.)."

Another says, "The air conditioner will consume 2 to 10 hp. depending on the job it is doing at the moment."

A third: "Depending on the type of control used on the air conditioner, it may use more or less horsepower at top speeds. One system, for example, uses 2 hp. at 15 m.p.h. and uses 15 hp. at 70 m.p.h."

Again depending on who is talking, this variable horsepower consumption makes no difference or a difference of as much as 20 m.p.h. in top speed.

The most noticeable effect of air conditioner horsepower consumption is on the small foreign cars. Some installers are mounting air conditioners on cars equipped with 40-50-60-hp. engines. As one automotive air conditioner producer stated it, "Put a 10-hp. load on a 40-hp. engine and the car will stall."

While this particular producer does not permit his installers to "put a compressor in a car whose engine is no larger than the compressor," there are many such small car installations being made with apparent success.

Quite a few hold that this horsepower consumption of, say, 10 hp. is not practically significant under normal conditions on American cars. Some point out that the car's radiator fan, alone, takes some 15-20 hp.; the generator consumes several horsepower, and the simplest automatic transmission "uses many times 10 hp."

Some time ago, one company conducted several tests which seemed to indicate that on a turnpike trip a car with air conditioning used less gasoline than one without air conditioning. The explanation was offered that the reduced power required due to the reduction of air turbulence when windows are closed more than overcame the horsepower requirement of the cooling unit. Skeptics would like the run repeated with the windows closed as in fall and spring driving on a car without a conditioner.

"SOAK-DOWN" tests conducted in the hot Arizona sun by Ford Motor Co. reveal that cars with tinted glass take one-third longer to reach maximum interior temperatures, although the final temperature is the same in both cases.

THE EFFECT ON OPERATING COST

Everything so far discussed, of course, affects operating cost. Nevertheless, with the exception of the figures presented in the accompanying article, no one is willing to discuss the cost of operating a car with air conditioning. In fairness, it must be pointed out that very few actual studies have been made of the subject so that almost no authoritative information is available.

THE EFFECT OF TINTED GLASS OR SHADES

There does seem to be general agreement that tinted glass or shades have a beneficial effect on conditioner operation and customer satisfaction. One man claims to have noticed a 10° difference in temperature by holding a thermometer on his shoulder while sitting in a car on a sunny day. The lower reading was obtained with the use of the venetian blind type shades.

A conditioner manufacturer states that his records clearly show customer complaints are very definitely and greatly lower on cars with tinted glass.

CUSTOMER COMPLAINTS

A customer complaint of "no cooling" can very frequently be prevented by the customer himself, most producers agree. A simple item like a partially open ram air intake can dissipate all the cooling effect produced by the conditioner. The customer must be trained to operate the unit occasionally during fall and winter to keep the seals wet and to maintain lubrication of all parts. Belt tension must be watched; it will change, especially after the first couple hundred miles after installation.

Noise complaints are frequent. "We must get across to the customer the fact that the air conditioner has moving, working parts; there will be sounds when they operate that are not there when the unit is idle. And we have to teach him and the serviceman to watch for such things as loose belts and worn mountings which add unnecessary sounds.

When the evidence and opinions are considered, it is safe to conclude that to obtain cooling in a car, the owner does pay a price—to one degree or another—in car performance. From the continuous growth of automotive air conditioning sales, it is obvious that consumers are willing to pay the price.

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Climatic Air Division, Tyler Service Part Co., Tyler, Texas
Eaton Manufacturing Company, Cleveland, Ohio
Export Processing Company, Detroit, Michigan
Frigikar Corporation, Dallas, Texas
Frigiquip Corporation, Oklahoma City, Oklahoma
Inskip, J. S., Inc., New York, New York
International Automotive Air Conditioning, Inc., Ft. Lauderdale, Fla.
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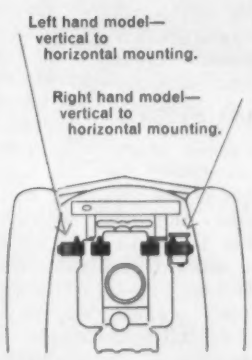

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Capacity Control Systems

Anderson Describes Three Types, Tells What Horsepower They Draw from the Auto Engine, What They Cost To Operate

In this discussion, R. V. Anderson, consulting engineer for the Mark IV Div., John E. Mitchell Co., Inc., Dallas, presents in detail his findings and opinions on the questions raised in the lead article on page 16. While Anderson discusses competing control systems, his willingness to cite specific data makes his presentation of considerable legitimate interest and value.

Anderson is the inventor of the Mark IV automobile air conditioner and was president of the producing company until its acquisition by the Mitchell group.

In the comparative examples he uses, Anderson has assumed that an automobile without air conditioning will obtain 15 miles per gallon of gasoline and that the cost of gasoline is 30 cents a gallon.

When an air conditioner is installed on a car, whether it is a factory-installed unit or a unit that is custom installed in the field, the effects of the unit on the automobile's performance are in some instances adverse and in others quite acceptable.

Since all air conditioners consist of the same three major components — compressor, condenser, and evaporator — and since the heat loads to be satisfied by this equipment would vary only slightly, it can be assumed that the air conditioner's effect on the car performance is directly influenced by the control devices employed by the air conditioner.

Since all present automobile air conditioning compressors are attached directly to the engine, it is reasonable to assume that the horsepower requirements will increase as the speed of the engine increases. It is also a well accepted fact that the displacement of compressors employed on all air conditioners develops an excess capacity at the higher engine speeds and that some type of control devices must be used to prevent this excess capacity from causing malfunction of the air conditioning unit.

The three types of control systems are 1) hot gas by-pass, 2) clutch cycle system, and 3) flow control type.

HOT GAS BY-PASS SYSTEM

As long as the speed of the car engine does not exceed the cooling requirements of the passenger compartment, the hot gas by-pass system is inoperative and has no more detrimental effect than any other system when it is operating without control or at full load. The hot gas system attempts to interrupt the refrigeration effect by cyclically diverting the compressor capacity by shunting the compressor. One method of a hot gas by-pass control is a solenoid valve with a thermostatic control element.

Another method of accomplishing the same objective is to employ a proportionating pressure-actuated by-pass valve. Since both methods are designed not to operate until the cooling requirements of the auto are satisfied, this type of system requires no more horsepower than any other system until the control begins to function.

As the engine speed increases, the by-pass valve is called upon to shunt more and more of the pumping capacity developed, and compressor is required to handle an ever increasing quantity of gas. This method is a very effective refrigerant control but it increasingly consumes engine horsepower as the speed increases.

Such a system requires 2 hp. at 15 m.p.h. with no by-pass effect; it requires 15 hp. at 70 m.p.h. with a major portion of the pumping capacity being diverted, because all of this gas still must be handled by the compressor. The more horsepower required by the compressor, the less available to drive the auto.

It has been observed that as much as 20 m.p.h. were taken off the top speed of a car with this type of system. The cost of operation of the air conditioner will go from 4 cents an hour at 30 m.p.h. to approximately 18 cents per hour at speeds above 60 m.p.h.

CLUTCH CYCLE SYSTEM

Systems employing this type of control insert a thermostatic element in the electromagnetic clutch circuit to disengage the clutch and stop the compressor operation when the cooling requirements of the automobile are satisfied. Here again, until the cooling requirements of the car are satisfied, no excess horsepower is required. This type of system is widely used. It is simple but has adverse effects on the compressor clutch life because of the impulse loads impressed on it by cycling the compressor at high speeds.

If it is assumed that the system has developed exactly the required cooling capacity at 30 m.p.h., then it is correct to assume that any speed above this introduces excess compressor capacity. At 60 m.p.h., for example, we would have twice the compressor capacity required at 30 m.p.h. and the compressor would have to stay disengaged half the time.

Since the refrigeration requirement is constant and the evaporator coils are small and the differential setting on the thermostat is narrow, the unit will engage and disengage quite frequently. Observations at 60 m.p.h. show as many as 40 cycles per hour required of the electromagnetic clutch to maintain the auto at comfort level and to prevent evaporator icing.

The faster the engine is driven, the more cycling. When the compressor is required to engage from zero to engine speed, a terrific impulse load is picked up by the engine. Part of this load is cushioned by the slipping and heating in the clutch. The balance is subtracted from engine power. Instantaneous values of this impulse requirement are as high as 20 hp.

Even though these are transient, they do subtract from the available horsepower an average of 8 hp. at high speeds. This means that they reduce the top speed of the car by about 12 m.p.h. and they require approximately 8 cents an hour as their operating cost at speeds above 60 m.p.h.

FLOW CONTROL SYSTEMS

Systems employing the flow control type of control maintain the cooling requirements of the car by controlling the compressor pumping capacity, and therefore the flow of refrigerant around the system is in inverse relation to compressor speed. That is, they reduce the quantity of refrigerant to be handled by the compressor as the speed of the engine increases.

They, however, maintain the required quantity of refrigerant to satisfy cooling requirements of the passenger compartment.

There are two such types of flow control devices presently being marketed—one an automatic flow control, the other a manual flow control device.

Assume at 30 m.p.h. the control device would be wide open and the unit would exactly satisfy the cooling requirements without any control. At speeds in excess of 30 m.p.h., the device begins to decrease the volumetric efficiency of the compressor as the speed increases. In so doing it does not require any additional horsepower to drive the air conditioner but only that required to maintain the cooling load.

With a system of this type, if 2½ hp. are needed at 30 m.p.h., at 90 m.p.h. about 4 hp. is required. The reason for this slight increase is that the control's effect on volumetric efficiency is not linear.

Today's engines increase in gas mileage efficiency as the speed increases. They operate at maximum efficiency between 40 and 60 m.p.h. There is a decrease in efficiency below and above this range.

The flow control device takes advantage of this increased efficiency and affects gas mileage only slightly. If 4 cents an hour is the operating cost at 30

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m.p.h., the cost is the same at 60 m.p.h. and about 4½ cents at 80 m.p.h. Top speed is reduced by 8 m.p.h.

THE COOLING SYSTEM

If the air conditioner condenser is placed in front of the radiator and requires the engine fan to draw air through it, a slight increase in static pressure is experienced because of this condenser location. This, of course, makes the engine fan slightly less efficient. While it is theoretically conceivable that the greater static pressure might reduce fan efficiency to the point that overheating results, the factor is actually negligible in all modern units, provided the condenser is clean.

In addition to the heat from the interior, the heat imparted by the compressor to the refrigerant must be rejected by the condenser which by its location must throw this heat directly on the radiator. This quantity of heat is quite small at idling speeds — about 6,000 B.t.u.h. Radiator fans draw approximately 400 c.f.m. across the radiator at idling speeds. This would mean a temperature rise in the air entering the radiator of about 14° F. If the ambient is 90° F., the air going to the radiator would be approximately 104° F.

OVERHEATING PROBLEM DIRECTLY RELATED TO AMBIENT TEMP.

It can be readily seen that the problem of overheating is directly related to the ambient temperature. Although this may seem to be a problem, it must be remembered that automobiles are not made for stationary application and that with only a slight forward motion of the car, the ram air increases. This ram air quickly overcomes the adverse effect of excess heat being thrown by the condenser onto the radiator.

Auto Cooling Is 30% Of Eaton's Business, Seen As Growth Area

CLEVELAND — Automobile air conditioning is the "growth area" for Eaton Mfg. Co.'s Heater Div., according to R. F. Gamundi, general manager.

The division and its predecessor, Perfection Heater & Mfg. Co., has been making auto heaters for more than 45 years.

Last year, however, auto air conditioner parts and systems accounted for 30% of the division's output, Gamundi said. The division produces air conditioning units for nearly all U. S. and some foreign cars. Sales of these systems reportedly have doubled in each of the past three years.

The division entered the auto air conditioning business with its electro-magnetic clutch in 1952. By 1955 it was turning out complete systems. It introduced its first under-dash air conditioner that year, it was noted by Gamundi who says rear-end air conditioning systems are obsolete.

Growth of this phase of its business was so rapid that in 1957 the division had to expand the plant by 33%. It employs 750.

Reaction:

Comment of Engineers Ranges From Mild Interest To Forceful Objection

Authoritative reaction to the preceding articles on the effect of adding air conditioning to a car varied from mild interest to forceful objection.

The manuscript of both articles was submitted for comment both to those who had contributed to the discussion and those who had chosen not to participate. Objections tended to be general in nature, and no specific refutations were available for publication. (There was one exception—a major producer with data to present but whose corporate public relations setup is such that the information could not be made available for this issue.)

For the most part, representatives from original equipment manufacturers—the auto producers—took a dim view of the statement that the auto air conditioning industry used consumers as guinea pigs. On the other hand it was an auto maker's engineer who stated, "We don't tell the customer really how much horsepower he gets from his engine; he doesn't know what horsepower is consumed by his automatic transmission, his power accessories. Why should we tell him what happens to the car when we add air conditioning?"

While several engineers questioned Anderson's figures on the cost of operating air conditioning, no alternate figures were offered. Some typical reactions:

"When we add air conditioning to a car, we design the car for it. We use special radiators, special engine fans, special fan shrouds."

"The OEM people insist that their installations are necessarily superior to add-on units. They go to the extreme of saying that they design the cast and camber to compensate for the extra weight. To this I ask merely, 'How do they compensate for a 200-lb. passenger sitting over the right rear wheel?' "

"Anderson classes as 'terrific' the impulse load picked up by the engine when the air conditioner engages at high speeds. I certainly would not use the term 'terrific.' "

"I consider it questionable, even untrue, that all cars heat more when air conditioning is operating, than when it is not."

"The questions and answers you have discussed seems to us to be quite competent."

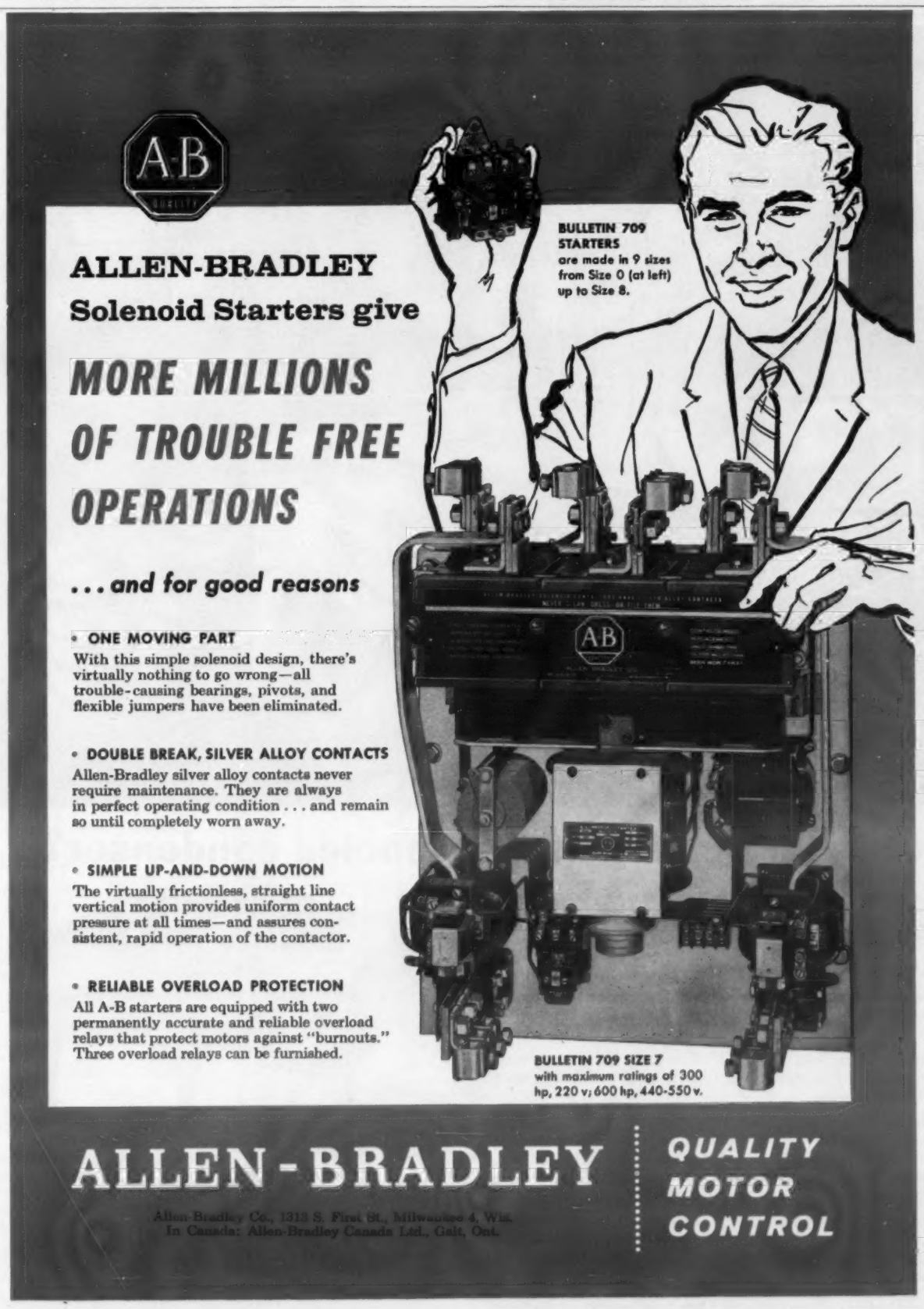
"Anderson failed to point out specifically that additional air required for engine cooling is usually provided for by larger fans—speeded up."

"On our system, we use a maximum of 8 hp. with air conditioning at 75 m.p.h. This is substantially less than pointed out in your article."

New York Post Office To Get Central System

WASHINGTON, D. C. — The General Services Administraton has awarded a $600,000 contract to Raymar Contracting Corp. of Long Island City to install central air conditioning at the Grand Central Annex Postoffice in New York City, according to Sen. Kenneth B. Keating (R., N. Y.).

Raymar was lowest of 14 bidders, it was reported.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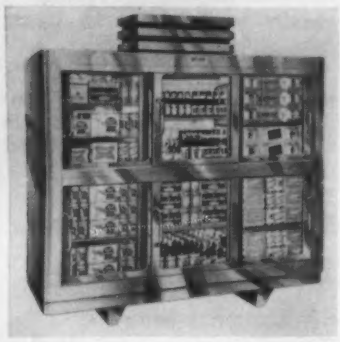


● A new series of upright refrigerators specifically designed for the display and merchandising of carry-out beverages has been introduced by Koch Refrigerators, Inc., Dept. AH&RN, 401 Funston Rd., Kansas City 15, Kan.

Koch manufactures Series MY models in sizes from 45 cu. ft. net capacity through 92.5 cu. ft. The cases will cool and merchandise 232 six-packs in the 45.5-cu. ft. size, 352 six-packs in the 70-cu. ft. size, and 462 six-packs in the 92.5-cu. ft. model, the company said.

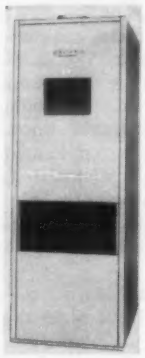
Packaged beverages are displayed behind sealed, double-glass doors. The one-piece, die-stamped, stainless-steel-framed doors "slide easily at a finger touch on the chrome-plated handles." Extra heavy-duty shelves are adjustable without tools on 1-in. centers. The exclusive behind-the-mullion duct and louver system distributes chilled forced air the full height of the cabinet, it was stated.

Series MY models are carried in stock in two styles: for remote installation of the refrigeration condensing unit; or self-contained, using the Koch plug-type refrigeration system.

More details on the products described on these pages may be obtained by writing the manufacturer at the address given in each story.

Flush-Front Cabinet Marks Bonair Furnace

● Availability of the first of its 1960 line—new gas-fired hi-boy winter air conditioners, models 70HGB, 85HGB, and 100HGB—has been announced by Bonair Div., Peerless Products Co., Dept. AH&RN, 23rd and Sedgley Sts., Philadelphia.



New flush-front cabinets are among features of the units. They are 57 in. or 63 in. high, 22 in. wide, 29 in. deep, and are approved for zero clearance on sides and rear, the company said. Flue pipe diameter is 6 in.

"The heating element is welded into a seamless gas type unit and two baffles are scientifically designed and placed for maximum heat extraction," it was stated. "Thick, foil backed glass wool insulates the heat exchanger. The blower motor is rubber mounted. The welded steel base is of rigid construction and the heavy gauge steel cabinet is finished in baked enamel."

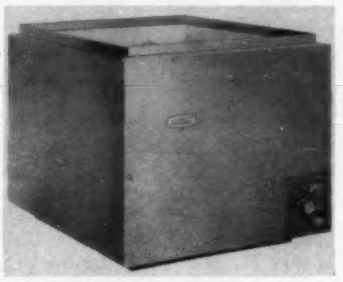
Develop Small-Shot Foam Producing Unit

● To supplement its line of polyurethane foam machinery, a "Miniature Model" small-shot production unit has been developed by The Martin Sweets Co., Inc., Dept. AH&RN, 114 South First St., Louisville 2, Ky.

It is capable of pumping, metering, and mixing two-component formulations for rigid, semi-rigid, or flexible foams, according to the company. The throughput is variable from zero to 2 lbs. per minute.

"With the self-cleaning, on-off mixing device, shots of mixed materials can be accurately proportioned, dispensed, and reproduced in quantities of a few grams to continuous pours," the company said.

The self-contained unit measures 33 in. by 26 in. with an over-all height of 52 in.

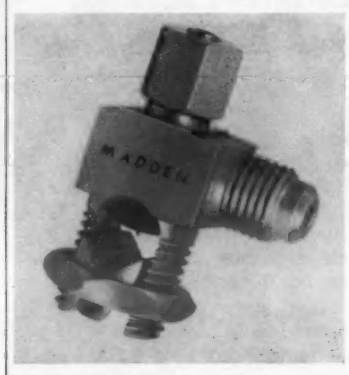


Lennox Adds 2-Ton 'A' Cooling Coil

● Addition of a new nominal 2-ton cooling coil to its line of air conditioning equipment has been announced by Lennox Industries, Inc., Dept. AH&RN, 200 S. 12th Ave., Marshalltown, Iowa.

The LS3 series coil is designed to be added to an up-flo forced air furnace. It features an "A" type coil with three rows of tubes and a net face area of 2.29 sq. ft.

Coil and expansion valve are enclosed in deluxe steel cabinet with fiber glass insulation. Cabinet dimensions are 21 in. wide, 14 in. high, and 18 in. front to back. It is designed to be connected to a Lennox remote air-cooled condensing unit.



Tube Piercing Valve Has No Handle

● A new tube piercing valve "with no handle to discourage tampering and prevent accidental turning" has been released by Madden Brass Products Co., Dept. AH&RN, 700 Sheffer Rd., P. O. Box 444, Aurora, Ill.

This new HP-41A valve is operated by an Allen wrench.

"All in one piece, the HP-41A combines V-block and lock nut in one unit," the company said. "It requires no special tools, no extra parts to assemble and to be carried by user, thus cutting installation time. The HP-41A mounts in any position, is easy to use for fast testing, charging, or purging of any hermetically sealed unit."

Ever hear of a bashful air-cooled condenser?

Check the new Halstead & Mitchell vertical air flow condenser

H&M's new ACV Air-Cooled Condenser with vertical air flow hates to be showy. It's so low and so quiet, you hardly know it's there—very appealing to owners, their neighbors, architects and engineers!

Roof loading is low, too, and air flow noise is directed away from surrounding structures. This delights building owners and tenants alike.

Vertical air flow models are available in 5 to 100 tons. And like all H&M Air-Cooled Condensers, the ACV series features exclusive Turbu-Flo fins, spaced wide to prevent clogging by air-borne dirt. Multiple circuiting is available for your specific needs *at no extra cost.*

Get the whole story on H&M Air-Cooled Condensers—with propeller or centrifugal fan. Ask your refrigeration wholesaler for a copy of the new bulletin AC-102. Or write to Halstead & Mitchell, Bessemer Bldg., Pittsburgh 22, Pa.

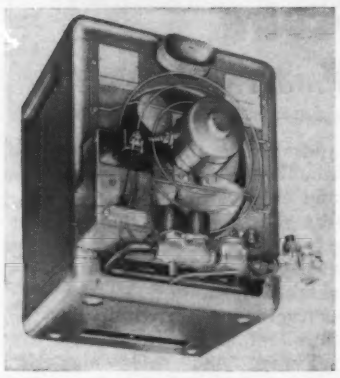
ACV SERIES — 5 TO 100 TONS

HM Halstead & Mitchell

Air-Cooled Condensers • Finned Coil Products • Water-Cooled Condensers • Cooling Towers

What's New

Unit Heater Eliminates Hot Air Blasts



● Lower operating cost and the elimination of annoying sudden blasts of hot air are two benefits claimed to be derived from a new type of gas-fired unit heater announced by Carrier Corp., Dept. AH&RN, Syracuse 1, N. Y.

The trim, compact device is a fully automatic, two-speed, propeller-type unit heater approved by the American Gas Association, according to Carrier. It is designed for use in small offices and stores.

"The unit begins operating at a low heat output and fan speed under the control of a sensitive two-stage thermostat," it was explained. "The initial low speed is maintained unless more capacity is needed. The thermostat then automatically shifts to high heat output and fan speed.

"Low voltage controls permit use of a more sensitive thermostat with simple wiring to reduce electrical installation costs. The unit is presently offered with an output of 30,000 B.t.u. in the low stage, and 50,000 B.t.u. in the high stage."

Mount Provides for Leveling Screw

● A new model "UL" Unisorb "Level-Rite" machine mount has been developed for use under machines with leveling screws built into the feet or at load bearing points, according to Unisorb Div., The Felters Co., Dept. AH&RN, 210 South St., Boston 11.

The product combines Unisorb vibration control pads with a cast steel base plate, which has a recessed center to accept the external leveling screw. The mount is said to eliminate all need for anchor bolts, lag screws, grouting and shim plates; and the machine can be moved whenever it is required.

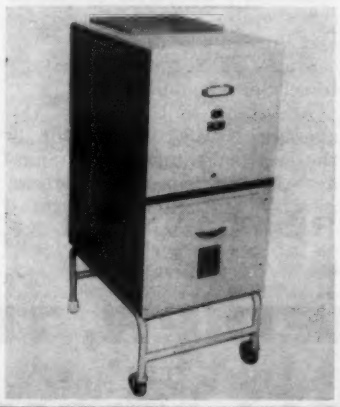
The Unisorb UL design is being made available in a range of sizes from 4⅝ in. square to 10⅝ in. square, with maximum loadings per unit up to 7,500 lbs.

Increase Size of Electrostatic Cleaner

● Development of a new, large-size, portable electrostatic air cleaner which will handle 1,200 c.f.m. of air has been announced by Radex Corp., Dept. AH&RN, 2076 Elston Ave., Chicago 14.

This model W1625A is a free-wheeling, plug-in model (115-v., 60-cycle) for use in small stores, different sections of department stores, restaurants, etc., to remove odors and airborne particles, the company said. It also removes hay fever and asthma pollens, it was stated.

No ozone is generated, Radex said, adding that the unit uses only 220 watts of current.



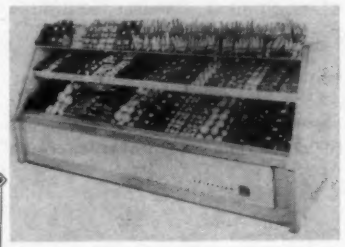
Unit Cooler Casing Is Stainless Steel

● For reach-ins and sliding door cabinet applications where stainless steel is required, Bohn Aluminum now offers its model C unit cooler with a stainless steel casing and with all other parts (except the motor) "Bohn-Koted" for protection from corrosive atmospheres resulting from vinegar acids.

This was announced by the Commercial Dept., Danville Div., Bohn Aluminum & Brass Corp., Dept. AH&RN, Danville, Ill.

The new corrosion resistant model C is available from stock in three sizes (1300, 1700, and 2300 B.t.u.hr. at 10° T.D.).

Bohn-Kote is a special vinyl plastic coating which was developed several years ago in conjunction with a large midwestern university, and subsequent field tests, according to Bohn, have shown the finish to be effective.



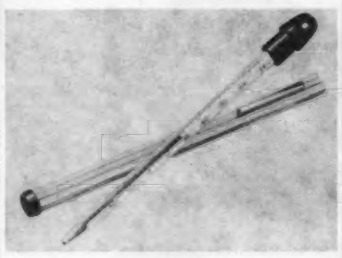
Shelf, Bar Boost Produce Case Capacity

● A produce merchandiser that displays more products with the addition of a refrigerated shelf and a special top display bar has been introduced by Friedrich Refrigerators, Inc., Dept. AH&RN, 1117 East Commerce St., San Antonio, Texas.

The new second shelf, 24 in. deep, is adjustable in two ways. It may be raised or lowered to suit merchandising requirements, or it may be tilted at different angles for more display impact, the company said.

The front of the case has been lowered to 29 in. "which provides a convenient shopping level."

"Friedrich's exclusive 'Floating-Air' assures proper humidity and cold control for the refrigerated shelves," it was stated. "Top display bar adds merchandising space for more sales of non-refrigerated items. Matching iced produce case is available."



Pocket Thermometer Resists Shocks

● A new "Gold Ribbon" pocket thermometer said to have unusually high resistance to mechanical and thermal shocks has been introduced by Bacharach Industrial Instrument Co., Dept. AH&RN, 200 N. Braddock Ave., Pittsburgh 8.

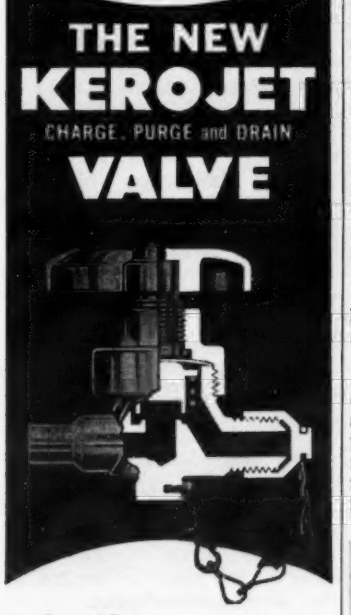
This quality is the result of a unique method of rubber-cushioning a thoroughly-annealed glass thermometer tube which has a high-strength tapered bulb, according to Bacharach.

The instrument is "vision-engineered," its numerals and graduations being etched, black-filled, and magnified against a sealed-in yellow background on double-wing, flat reading surfaces.

Two ranges are currently being offered: -40° to +120° F., mercury filled; and -50° to +120° F., red spirit filled. Price of a complete thermometer, either range, is $2.55. Refill tube is priced at $1.70.

Precision Designed for
REFRIGERATION and AIR CONDITIONING SYSTEMS

THE NEW KEROJET
CHARGE, PURGE and DRAIN
VALVE



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Designed for ease of operation, this new valve features compact packless diaphragms of beryllium copper and stainless steel, for maximum resistance to wear. Rugged forged brass body has integral mounting flange. Maximum operating pressure, 500 p.s.i. Maximum temperature, 200° F. Connection size inlet ⅜" solder connection—outlet ⅜" male flare. See your Kerotest wholesaler today.

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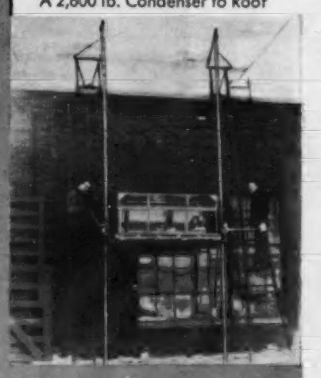

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Profile of a Distributor

NCRSA Study Pictures Typical Outlet Today and 3 Years Ago

PHILADELPHIA—What sort of "profile" does the average distributor of commercial refrigeration equipment and store fixtures present?

To find out, the National Commercial Refrigerator Sales Association has drawn up a composite profile based on the 1958 performance of 78 members representing all size categories. Their sales ranged from $99,900 to $3,200,000.

NCRSA recently published its findings in an eight-page folder and distributed it to members and the press.

"The profile," declared Marie Lawton, executive secretary, "contains a composite picture of the average NCRSA distributor and illustrates the facilities and services he furnishes his customers and suppliers."

According to the profile, the average NCRSA distributor is the local sales and service engineer for refrigerator cases and eight related lines of food store equipment. His sales in 1958 averaged $714,340. He carried an inventory at cost of $73,595 which he turned 7.3 times annually.

Of total dollar sales, 46.57% were new refrigerator cases, 15.61% counter equipment and other store fixtures, 10.38% air conditioning, 9.30% service and installation work, 6.55% refrigeration parts and supplies, 5.66% products he manufactures, and 5.93% used equipment and miscellaneous income.

More than 90% of distributors provided store layout plans; service during warranty; store engineering; installation and start-up; financing; contract for all equipment, fixtures, and supplies; and back room layout.

The average distributor's physical plant covers an area of 17,925 sq. ft. and has, generally, the following six departments: office, display room, warehouse and storage, manufacturing and woodwork, service department, and engineering and drafting.

An off-street parking lot or parking areas is available for customers at 82% of distributor establishments.

Average distributor has 23 plus employes, including four salesmen and sales manager, seven servicemen and service manager, eight carpenters and cabinet men, and six sheet metal men.

The 84% who own their trucks average 4.8 vehicles, while the 16% who rent average two.

Nearly 85% of distributors take an active part in community activities, participating in chambers of commerce, business mens associations, grocer's associations, sales executive clubs, and engineering societies.

Three years ago, NCRSA drew up its first profile. How do the two compare?

According to NCRSA, the average distributor has increased his sales by 11.06% while cutting down on total personnel by 11.86%. He carries a slightly larger inventory and has a larger physical plant (nearly 10%) with an increase in equipment lines of 4.6, or 92%.

Closer inspection indicates that counter equipment and other store fixtures are accounting for a larger share of his sales volume at the expense of refrigerator cases and air conditioning. He is selling more refrigeration parts and supplies and less used equipment.

The cut in number of employes has been made largely among servicemen and sheet metal men. Sales staffs have been bolstered slightly and carpenters and cabinet makers substantially.

Despite fewer servicemen, more of his plant is devoted to the service department.

In New Super

Produce Receiving, Operating Combined For Tighter Control

CHICAGO—One refrigerated room, rather than separate facilities, is being used for produce storage and work operations in the recently-opened Paul's Super Food Mart here.

Geared to do $1½-2 million annually, the 12,500-sq. ft. store has combined produce receiving and operating to get tighter control and increased work efficiency.

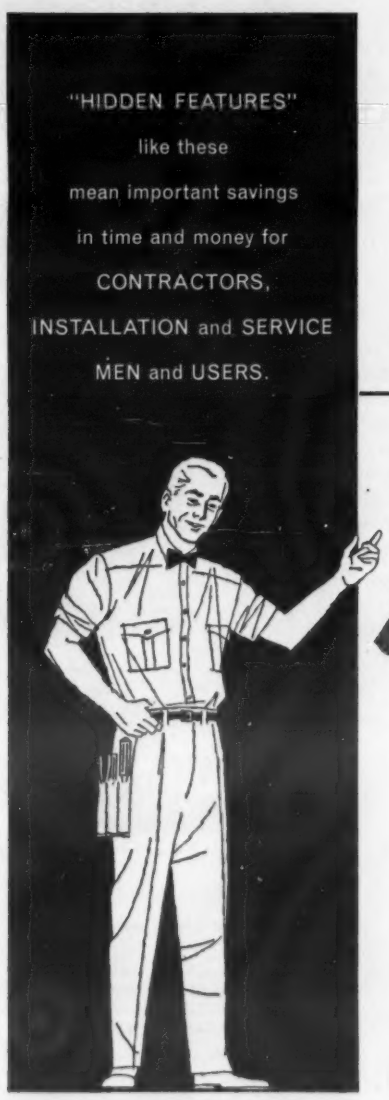
Under produce manager Walter Szafraniec, five full time and three part-time workers handle produce storing, packaging, and marking in the 1,500-sq. ft. work room, which is kept at a constant 50° temperature. Products move into store racks, kept between 38 and 42°.

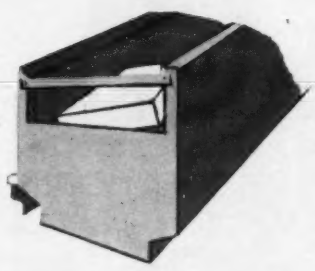
Engineers of Lee Shell Co., Inc., whose design used was based on a similar operation in Grand Rapids, Mich., said that the cost paralleled that of conventional separate facilities.

Proper PRE-PLANNING at the TYLER FACTORY assures

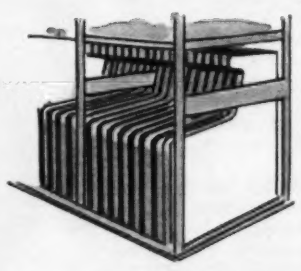
SPEEDIER, TROUBLE-FREE INSTALLATION AND SERVICE

"HIDDEN FEATURES" like these mean important savings in time and money for CONTRACTORS, INSTALLATION and SERVICE MEN and USERS.

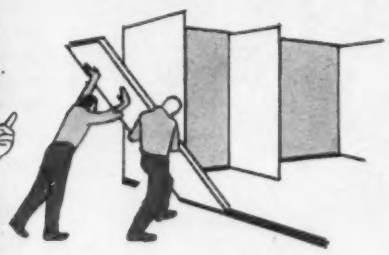




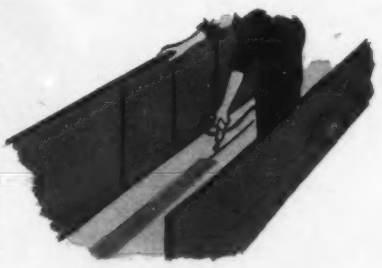
PARTS and ACCESSORIES packaged, labeled, shipped inside case. Saves installation time . . . avoids mix-ups.



Sales-Case ENDS INSTALLED AT FACTORY . . . not in store. Cost in original price . . . not installation extra!



SECTIONAL CONSTRUCTION and use of patented OSCILLOCK speed up installation of Tyler Walk-Ins.



ALL JOINTS in welded-steel shell are SPRAY-SEALED . . . Tyler thoroughness produces an airtight outer shell.

A LEADING USER REPORTS:

"We gain the full advantage of lower installation costs every step of the way because of first-rate pre-planning by both the Tyler factory and the Tyler Distributor . . . we've just opened our fifth Tyler-equipped Baker's Super Market at Bellevue, Neb.

—says outstanding merchandiser Abe Baker, Baker's Super Markets, Omaha, Nebraska.

Tyler opens up new profit opportunities to aggressive, well-rated commercial refrigeration organizations. Write today for details.

Tyler Refrigeration Corporation, Dept. AR-3, Niles, Michigan.
Send details on ☐ Tyler Distributor Franchise Program ☐ Sales-Cases ☐ Air-Skreen Sales & Storage Coolers ☐ Condensing Unit Assemblies ☐ Shelving ☐ Checkouts ☐ Reach-Ins ☐ Storage Freezers ☐ Walk-in Coolers ☐ Rolling-Cold Packaging Conveyors.

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Installation & Service Practices In Commercial Refrigeration

One of a group of discussions on several phases of the installation, operation, and servicing of commercial refrigeration equipment.

By Frank J. Versagi

Line Sizing In Commercial Refrigeration

One section of the series on "Installation & Service Practices In Commercial Refrigeration" dealt with line sizing. The article pointed out that installers must watch carefully the instructions supplied by the several manufacturers since they differ in recommendations on line sizes for quite similar fixtures and assemblies.

Recommends Smaller Lines

Reaction to the discussion has brought out that there is one major item of concern and disagreement among installing contractors—the size of liquid lines to cases. More than one contractor has shown me manufacturers' line size recommendations on almost identical fixtures which vary by one size in copper tubing dimensions. Actually, one major commercial refrigeration manufacturer consistently recommends smaller liquid lines than does its competitors for comparable installations.

Cites Reasons

Asked why its liquid line sizes are smaller than those of its competition, the company supplied several answers:

"First, the hundreds of successful installations which follow our recommendations clearly show that we are correct in our calculations. Were we wrong, we would have been forced to change by now.

"Second, the advantages to the customer are obvious. He saves not only on the price of the copper tubing but on refrigerant. It takes a lot more refrigerant to fill several hundred feet of ½-in. copper tube than to fill the same length of ⅜-in. tube. Further, with less refrigerant, it is not necessary to oversize condenser-receivers to obtain full pumpdown capacity.

"Third, functionally all that is required is that the liquid line be full of liquid refrigerant to the expansion valve and that no flashing occurs in the liquid line.

"Fourth, while competitive cases designed for the same use may seem alike, they definitely are not identical, and the difference in construction may be significant to the amount of refrigerant needed to produce and maintain a specified refrigeration capacity."

The chief engineer of the manufacturer cut deep to the core of the discussion: "These are all very good as far as they go, but the real point is **how** we do it, not **why**. And, simply, the answer is **by taking advantage of predictable factors which exist in commercial refrigeration installations but do not exist in the typical air conditioning job.**"

The engineer pointed out that most line sizing recommendations are based on the air conditioning installation rule that there should never be more than a 5 p.s.i. pressure drop in the liquid line. While this is a valid rule as far as it goes, the fact is that, most of the refrigeration lines in a commercial installation are run through trenches.

"The many feet of proximity between liquid lines and suction lines provides a most effective heat exchange which subcools the liquid line so much that the line can stand much more than the traditional 5 p.s.i. pressure drop without causing flashing of the liquid.

Assumes Knowledge On Part of Contractor

"Obviously, our recommendations assume that the installing contractor is knowledgeable. If he is going to run his lines through a hot attic, rather than a trench, the heat exchange effect will not be working for him, and he will have to increase the liquid line size."

Asked about the effectiveness of a heat exchanger in the case itself, the engineer replied that in normal temperature cases, "the heat exchange possible in a 15-18 in. of tube-in-a-tube is meaningless. In a low temperature case, heat exchange is practicable (we use 56 in. of tube-in-tube). A heat exchanger is designed to do two things: increase the capacity and subcool the liquid. The TD (temperature difference) between the two media in a normal temperature case is just not enough to be considered, in our opinion."

On the subject of figuring the equivalent length of fittings when determining line lengths, the engineer said that his company's—and he thinks other companies' — recommendations are based on the "average number of fittings" which would be used in a typical installation. Thus, a 50-ft. liquid line recommendation would indicate a line whose total length from receiver to expansion valve would be 50 ft.—including "a half dozen fittings."

Friedrich FloatingAir Curtain

FRIEDRICH REFRIGERATORS, INC., San Antonio, claims to have combined the efficiency of FloatingAir refrigeration with the versatility of vertical display by the introduction of their new FloatingAir curtain. Each shelf is cooled individually by properly refrigerated and humidified air, brought through duct in the rear door to float over and around the food products. Individual shelf cooling guarantees a more constant, uniform cold level, eliminating product spoilage and increasing efficiency of operation. The FloatingAir curtain flows down the front of the case, staying in the case eliminating costly spillage into the store. The shelf arrangement is completely flexible and allows for the adding of shelves as merchandising requirements change. The extra large self-service opening provides greater display and merchandising impact, according to the manufacturer.

Star Metal Halts Custom Production

PHILADELPHIA — Star Metal Mfg. Co., Inc. announced that effective immediately it will discontinue the manufacture of custom equipment.

This change in operation was necessitated by an ever-increasing demand for standard products, the company said. In the future, all Star Metal standard products will be in inventory, available for immediate delivery, it was stated. To supplement the existing Star Metal standard equipment lines, several new products are under development which will be available within the near future, the firm said.

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(and yours, too!)
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Speed-Freeze
PRODUCTS
BEVERAGE COOLERS
unexcelled storage capacity with Ice Cube Makers
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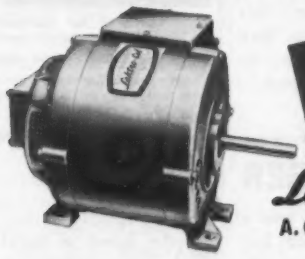
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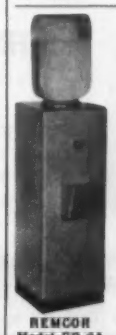
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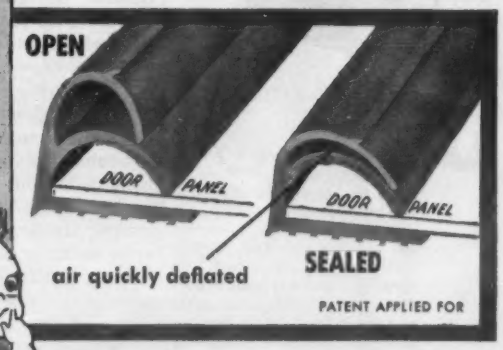

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NSF Will Release Sanitation Standards

ANN ARBOR, Mich. — The National Sanitation Foundation said recently that NSF sanitation standards relating to dispensing freezers (soft ice cream dispensers) and commercial refrigerators and freezers will be released soon.

These standards, like others already available, have been developed on a cooperative basis between public health officials, user groups, and equipment manufacturers, it was noted.

Newest standard is one relating to commercial hot water generating equipment. Others pertain to soda fountain and luncheonette equipment, food service equipment, spray-type dishwashing machines, commercial cooking and warming equipment, and food and beverage vending machines.

THIS INSTALLATION of "Air-Skreen" combination cooler-display cases is typical of the multiple use of these Tyler fixtures. The nine cases along the wall are all backed with coolers where produce is stored and from which produce is loaded directly into the display cases through sliding doors. These Air-Skreen coolers are in Woodward's supermarket, Vancouver, B.C., Can.

Tyler Announces Sales of More Than 600 'Air-Skreen' Coolers During First 3 Years

NILES, Mich. — "More than 600 'Air-Skreen' coolers have been sold since we introduced this effective merchandising fixture to the trade some three years ago," stated a spokesman for Tyler Refrigeration Corp. in a NEWS interview recently.

He also indicated that Tyler will be announcing soon a new "Spot Freezer" or island low temperature case with foam-in-place insulation throughout.

Discussing the company's experience with the Air-Skreen, the combination display case and cooler which make use of a moving layer of air at the case front, Arthur Perez, chief administrative engineer, pointed out that with the exception of a couple misapplications, the fixtures have proved extremely effective merchandisers.

An example of misapplication was that at a military commissary. While the front or display face of the fixture was properly installed, the cooler section was mounted through the wall and the entire cooler was exposed to outside weather. "We just hadn't designed the unit to handle sun load," mused Perez in obvious understatement.

As is true of most refrigerated display cases, the Air-Skreen is designed to handle a calculated service load and no product load to speak of. "It is assumed that the product will be loaded into the fixture at the proper temperature."

In another case of misapplication, in Latin America, the case was expected to handle 125 cases of beer a day, **warm beer!**

In still another instance, a cooler was being used so frequently that observation showed the doors were open as long as 1½ hours, four time a day.

In some instances, it is possible to handle the increased load by installing a larger compressor and adding another coil in the cooler section, according to Perez.

More and more users are going for large installations of Air-Skreen with as high as 104 ft. of display footage, the company noted. "In a few places, they are rounding corners with Air-Skreens, so that two walls are working as effective merchandisers of meat and dairy products and beverages."

The spot cooler which is soon to be announced is a portable, self-contained low temperature case designed for four-side shopping. While Tyler has used refrigerant - expanded urethane foams in portions of some of its products, this spot cooler will be the first of its line to make use of the foam-in-place insulation throughout.

Name Directors, Officers

NILES, Mich.—Directors and officers of Tyler Refrigeration Corp. were named at the annual meeting of shareholders.

Newly-elected director is Robert L. Tyler, Jr. Newly-elected officers include John T. Nolan, secretary; Raymond L. Greene, vice president, regional sales; and Tom W. Curlin, vice president, Southwestern Div.

Officers re-elected are: Robert L. Tyler, Sr., president; George H. Mayhew, vice president and treasurer; Sam D. VanderWeg, vice president, manufacturing; Robert L. Tyler, Jr., vice president, administrative; Paul T. Jackel, vice president, national accounts; Harold E. Wickham, vice president, Wilson subsidiary; and W. R. Irwin, controller.

Board members re-elected are Raymond L. Beardsley, Spring Lake, Mich.; Samuel G. Creden, Philip A. Hadsell, George H. Mayhew, Leon L. Tyler, Robert L. Tyler, Sr., and Sam D. VanderWeg, all of Niles; and H. Everett Humphreys, Concord, N. H.

'59 Hill Sales Set New Volume Mark; Plan Program To Keep High Level In '60

TRENTON, N. J.—Glennon J. Doyle, president of C. V. Hill & Co., Inc., announced that sales for the commercial refrigeration concern for 1959 set a new volume mark.

New records were established by both national account and regional sales divisions, he said.

Doyle also outlined programs for keeping volume at a high level throughout 1960.

A series of coast-to-coast regional sales meetings for distributors and salesmen of Hill products got under way March 14 in Chicago. A team of four "Barnstormers" "hit the road" for approximately five weeks during which time sales personnel will be brought up to date on factory improvements, industry trends, selling techniques, and new models to be introduced shortly in the line.

Factory personnel conducting the meeting include H. N. Corbin, vice president in charge of sales; C. A. Butler, regional accounts sales manager; V. W. Smith, refrigeration sales engineer; and A. K. Thornley, Jr., sales promotion manager.

Formal start of manufacturing operations by C. V. Hill of Canada Ltd. on March 15 was also announced by Doyle. The Canadian plant, located in Barrie, will act as the basic manufacturing and distribution center for some 40 distributor accounts and chain store customers who formerly purchased through the Trenton factory.

Establishment of a manufacturing enterprise in Canada broadens the program of world-wide manufacturing and distribution of Hill products, it was noted.

Recently, licensing arrangements were completed with Gesfuer Linde's Eismaschien A.-G. of Mainz-Kostheim, Germany, for the manufacture of Hill equipment, and manufacturing agreements are being negotiated with several large refrigeration equipment manufacturing concerns in a number of other countries in order to effectuate world-wide manufacturing of the complete Hill line of refrigeration, Doyle indicated.

"We look to 1960 as being another excellent year for Hill, both in factory expansion, modernization, and in over-all sales volume," concluded Doyle.

Friedrich Names James P. McFarland

SAN ANTONIO — James P. McFarland has been named vice president in charge of the Commercial Div. of Friedrich Refrigerators, Inc.

McFarland

In making the announcement, R. L. Harrison, president and treasurer, particularly commended McFarland for his outstanding leadership in expanding (approximately doubling) and upgrading the Friedrich distributor organization, an accomplishment which has resulted in substantial increases in sales volumes.

McFarland joined Friedrich in 1945 as a distributor and operated an independent distributorship for 12 years, during two of which he also served as a regional manager for the Friedrich sales organization. In 1957, he gave up his distributorship to accept a position as commercial sales manager for Friedrich Refrigerators in San Antonio. In January, 1958, he was elected to the company's board of directors.

Moore & Hanks Names Hank Rollins

EL MONTE, Calif.—Appointment of Hank Rollins as general sales manager of Moore & Hanks Co., commercial refrigeration manufacturing and distributing firm here, was announced by William H. Moore, president. Rollins has been with Moore & Hanks for two years.

Easy as 1-2-3 to install the Temprite Bantam-100 CARBONATOR

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CONNECT SODA WATER OUTLET TO FAUCET 2

3 CONNECT TO WATER SUPPLY

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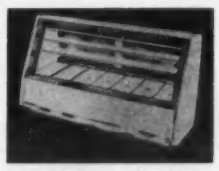

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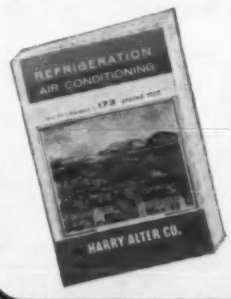

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Victory for CRMA Traffic Committee

New Commercial Refrigeration Truck Rates Save Distributors Money

CHICAGO—New truck rates that represent substantial savings to commercial refrigeration distributors and purchasers and less paper work for manufacturers are now in effect, the Commercial Refrigerator Manufacturers Association revealed recently.

Paul Sullivan, executive secretary, reported that the new truck classification amendment took effect last Dec. 18.

It represents a victory for CRMA's traffic committee, Sullivan declared, as the National Motor Freight Classification Board had reversed its previous position and given approval to the full CRMA recommended formula.

This formula is similar to that adopted by the railroads in 1958.

Provides Single Item Description of All Commercial Equipment

The amendment provides an all-inclusive single item description for all types of commercial refrigeration equipment instead of a variety of descriptions as in the past.

It also places reach-ins, ice cream cabinets, upright freezers, and various other products on a less than truck load rating of 92½% of first class. The board had previously insisted on raising the rate to 100%.

It further reduced the less than truck load rating on display cases of all types to 92½%, a straight saving of 7½%.

"Inasmuch as about 74% of the industry's total volume is display cases, this represents a rather handsome savings," Sullivan commented.

Unusual Truckload or Volume Rating Granted

The amendment further provides an unusual and rarely granted truckload or volume rating of AQ (any quantity) for all commercial refrigerator equipment except walk-in coolers, knocked down. On these the truckload rate of 55% of first class was retained, though minimum weight was reduced from 20,000 to 18,000 lbs.

The AQ rating, Sullivan explained, means that regardless of number of items shipped at one time or the combined weight thereof, the flat 92½% rating applies.

The amendment permits truck load shipments to be uncrated provided surfaces are suitably protected, and the items are properly braced.

"Since the bulk of commercial refrigeration production is handled on a F.O.B. factory basis," Sullivan said, "the new formula along with the similarly negotiated rail formula largely benefits our distributors and customers. Principal benefits to manufacturers is mainly in simplifying their paper work."

Leslie H. Fischer, director of traffic for Tyler Refrigeration Corp., chairs the traffic committee. Other traffic managers staffing the committee are William L. Brown, Hussmann Refrigerator Co. and Norman E. Seidel, McCray Refrigerator Co.

Consultants, all traffic managers of their respective companies, are Larry J. Frank, Koch Refrigerators, Inc.; A. H. Wertheim, Friedrich Refrigerators, Inc.; Albert Labate, C. V. Hill & Co.; and C. W. Lutz, Sherer-Gillett Co.

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Zero-Degree Code Should Not Be Adopted as Statute, But Used as Operating Practices Manual—NAFFP

CHICAGO — The AFDOUS "zero-degree" frozen food handling code should be considered as a manual of operating practices and objectives and should not be proposed for adoption as a statute or regulation, in the opinion of the directors of the National Association of Frozen Food Packers.

In a statement issued at the recent NAFFP annual convention here, the directors clarified their position on the code adopted last year by the Association of Food & Drug Officials of the U. S. They said its provisions do not lend themselves to enforcement as statutory regulations with criminal penalties for violation.

A code based on the AFDOUS code was adopted recently by Massachusetts, with enforcement to start Aug. 1, and Connecticut officials are planning to hold hearings on a similar code.

The NAFFP directors stated that their association "has long recognized the desirability of achieving the goal of a uniform temperature of zero degrees for the commercial handling of frozen foods, and continues to approve that goal.

"This goal should be achieved in a reasonable and practicable manner with recognition of the responsibility of industry to continue to make available to the public adequate supplies of sound and wholesome frozen foods.

"It is not consistent with the fulfillment of this responsibility to establish an absolute product temperature of zero degrees, since, with reasonable limits, temporary deviations from the zero level will not affect the soundness or wholesomeness of such foods."

The AFDOUS code came in for considerable discussion during the convention. One speaker, D. R. Lank, frozen food buyer for Marsh Food Liners, Yorktown, Ind., commented that his chain has display cases which can keep ice cream at -20° F., so it is no problem to keep other items at zero.

Lank also predicted that fresh frozen meat will come back strong in supermarkets in the 1960s through lower prices. He said some packers are planning to market such meats when fresh supplies are short.

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Michigan State University Study

Refrigeration Losses Through Open Doors And Conveyor Passes (2)

(Part 1 of this series dealt with Experimental Procedure and Experimental Results. Part 3 will be a discussion of Results and Conclusions.)

Robert M. Williams, T. I. Hedrick, Carl W. Hall
Departments of Dairy and Agricultural Engineering, Michigan State University

The results of losses from conveyor passes are charted in Figs. 4 and 5. The rate of these losses ranged from about 100 to 200 B.t.u. per min. through an area of 1.8 sq. ft. with an air velocity of 96 f.p.m. for the conveyor located 30 in. above the floor, and 1.6 sq. ft. with an air velocity of 160 f.p.m. for the conveyor located 10 in. above the floor.

The nylon curtain used to replace the standard cooler door, effectively reduced loss of refrigeration. After two hours no increase in temperature in the cooler could be measured. The only noticeable difference was that the refrigeration cycle was increased from four cycles in two hours to eight cycles in two hours under normal conditions.

The curtain also maintained a constant temperature for 20 minutes even though it was parted at 10 second intervals to simulate heavy traffic moving in and out. Slight fluctuations were observed in the temperature, but no more than the normal refrigeration cycle allows.

Figs. 6 and 7 illustrate the effectiveness of the rubber strips used to control refrigeration losses from conveyor passes. The exact number of square feet through which these losses occurred could not be determined exactly as the only measurable air flow came from beneath the strips and only trace amounts of air filtered through the strips.

Losses from rubber strips are shown in comparison to losses occurring where no strips were used. These calculations were based on -20° F. inside temperature, 74° F. outside temperature, with 45% relative humidity. The strips were very beneficial in controlling refrigeration losses under the above conditions and the rate of loss recorded with strips was about 66 B.t.u. per min. as compared to 500 B.t.u. per min. for the open conveyor pass.

Diverted air flow technique results are recorded in Figs. 8 and 9. These losses were based on 38° F. inside, 77° F. outside, with 60% relative humidity.

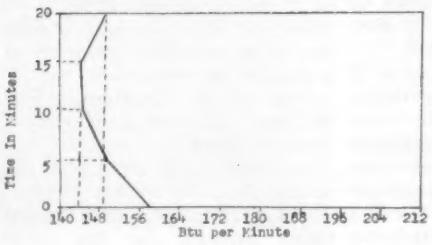

FIG. 4—Rate of refrigeration losses from conveyor pass 30 in. above floor with inside temperature 38° F.; 74° F. outside temperature.

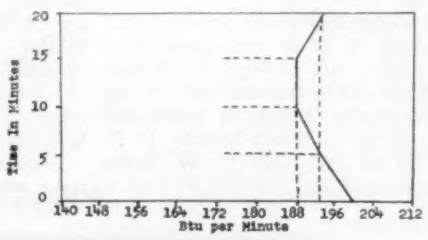

FIG. 5—Rate of refrigeration losses from conveyor pass 10 in. above floor with 38° F. inside temperature; 74° F. outside temperature.

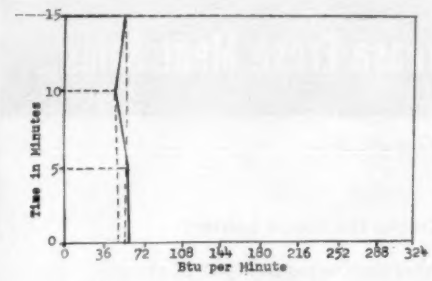

FIG. 6—Rate of refrigeration losses from conveyor pass using rubber strips with -20° F. inside temperature; 74° F. outside temperature.

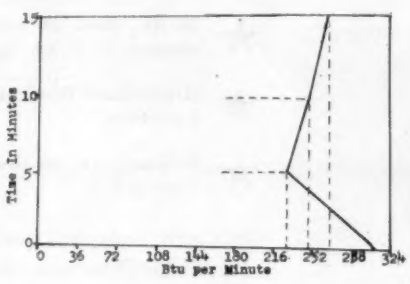

FIG. 7—Rate of refrigeration losses from conveyor pass without rubber strips with -20° F. inside temperature; 74° F. outside temperature.

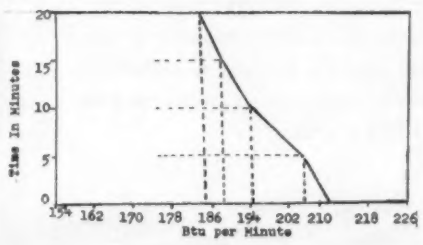

FIG. 8—Rate of refrigeration losses from open doors employing diverted air flow technique with 38° F. inside temperature; 77° F. outside temperature.

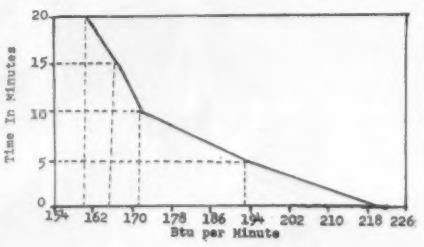

FIG. 9—Rate of refrigeration losses from open doors employing the diverted air flow technique and false floor with 38° F. inside temperature; 77° F. outside temperature.

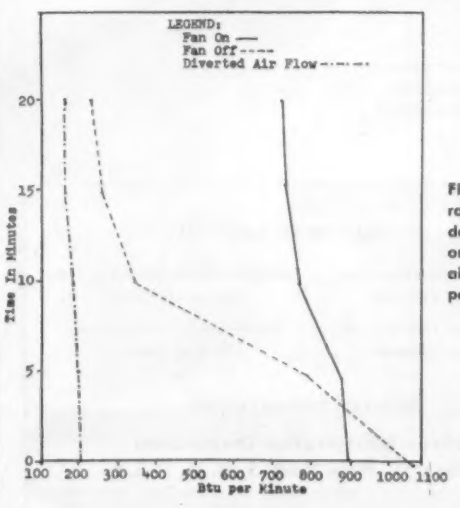

FIG. 10—Comparison of rate of losses from open doors with circulator fan on, off, and with diverted air flow, 38° F. inside temperature; 77° F. outside temperature.

Table 3—Air Flow Velocities Through Open Doors Into Cold Rooms

(Feet Per Minute)

Time, Mins.	Circulator Fan On	Circulator Fan Off	Diverted Air Flow
Start	160	177	88
5	160	177	88
10	160	133	88
15	160	124	88
20	160	124	88

Using the diverted air flow, it was impossible to measure directly the flow of air into the cooler as there was no direct flow. If warm air were to enter the cooler, it had to be incorporated with the cold air stream coming down across the door and then being pulled into the cooler by the circulator fans.

As the flow into the cooler would be equal in volume to the flow out of the cooler, calculations were based on the outward flow. This had a velocity of 88 f.p.m. (Table 3) and 3.5 sq. ft. of area through which losses occurred.

LOSSES WERE SLIGHTLY HIGHER WHEN FALSE FLOOR WAS USED

Losses were slightly higher when a false floor was used than when the overhead duct alone was used. This was because of the additional heat given off into the cooler by the motor of the suction fan used to complete the circulation to form the air screen.

A comparison of the losses from open doors, fan on and off, and losses from doors using the diverted air flow method is illustrated in Fig. 10. The greatest rate of loss using the diverted air flow was slightly over 200 B.t.u. per min. This was compared to a rate of loss of a little less than 1,000 B.t.u. per min. for standard doors when the circulator fan was on. When the circulator fan was off the rate of loss was slightly more than 1,000 B.t.u. per min. The diverted air flow technique gave a savings of about 80% at periods of heaviest losses.

RESULTS OF OTHER EXPERIMENTS

Results of other experiments conducted showed greater savings using a narrow, 2-in. duct opening which gave a high velocity air current, about 800 f.p.m., as compared to a 4-in. duct opening with a slow velocity of about 400 f.p.m. In 20 minutes the cooler temperature had increased only 4° with the narrow duct opening as compared to an increase of 7° when the wide duct opening was used.

Forcing the air straight down across the door also gave closer control of temperatures than did a deflector which allowed the air to come out at a 45° angle and depend on the natural air flow to force it down.

No differences could be observed in the temperature control between the rounded and 90° ells on the duct.

Compressor operating time was also reduced approximately 20% during periods when the cooler doors were closed by use of the diverted air flow.

(To Be Continued)

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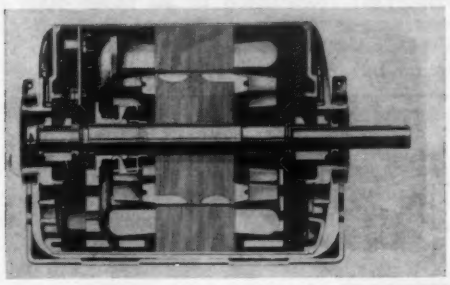
TECH CENTER

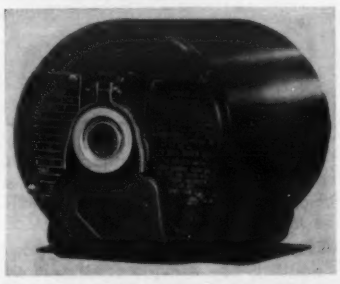
by Frank J. Versagi, Technical Editor

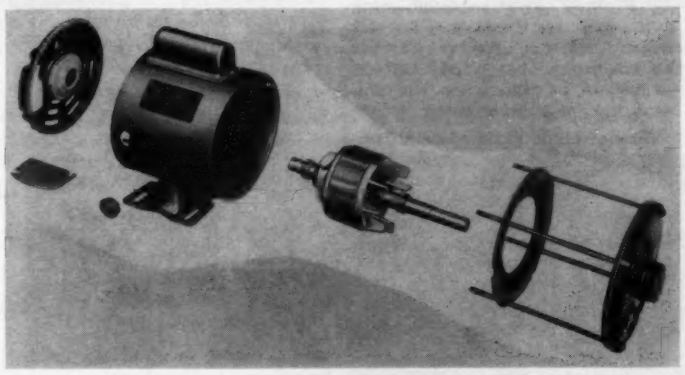
Applied Electrical Theory (Part 15)



SPLIT-PHASE MOTOR — Retouched cutaway shows position and relation of many components as rotor, stator, overload protector, lubrication system. Product photograph shows typical external appearance of split phase motor.

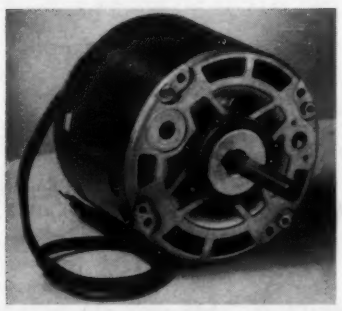
(Courtesy G-E)





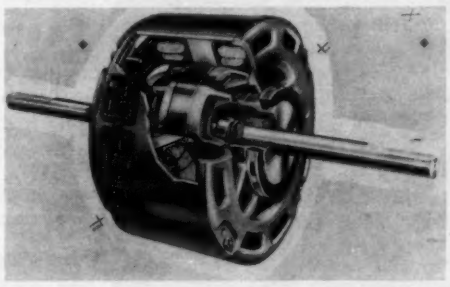
CAPACITOR TYPE MOTORS are built quite like the split phase motor. The capacitors, for starting or running duty, may be mounted on the motor or remotely.

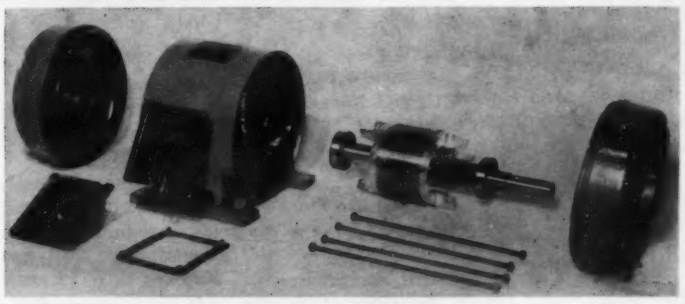
(Courtesy Wagner)



SHADED POLE MOTOR and PERMANENT SPLIT CAPACITOR MOTOR look alike but have a rather distinctive appearance.

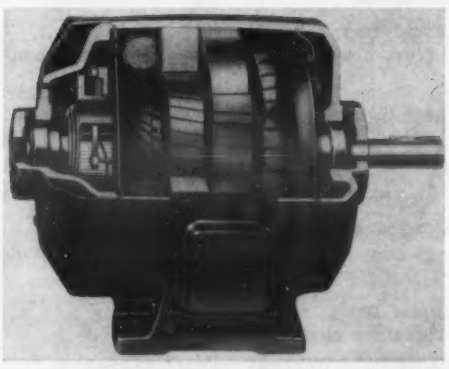
(Courtesy G-E)





THREE-PHASE MOTOR — Without actually studying the windings and electrical characteristics, it is difficult to tell this type of 3-phase motor from a typical split phase motor.

(Courtesy Wagner)



LEFT: REPULSION START, INDUCTION RUN MOTOR differs from the others in that the rotor is wound and that it makes use of brushes to direct the current to the two windings as needed.

(Courtesy Reliance Electric)

REVERSING ROTATION OF MOTORS

Reversing the rotation of a 3ϕ motor can be accomplished by exchanging any two leads to the motor. This reverses the order in which the pole pieces build up their successive field strengths.

Single-phase motors are not normally reversible in the field, although reversal is occasionally helpful in freeing a stuck motor. Split-phase and capacitor motors are reversed by reversing the connections to either one of the two stator coils.

A shaded pole motor can be reversed by disassembling the motor and reassembling it with the shaft extending from the opposite end.

Repulsion start motors are reversed by shifting the brushes.

A Look at Induction Motors

This segment of "Applied Electrical Theory" is designed to give a refresher look at the types of motors used in the heating-cooling industry. Those readers who choose may relate much of the previous theoretical discussion in this series to the tangible parts and assemblies illustrated here.

From "SERVICE TIP OF THE MONTH" issued by General Chemical Div., producer of "Genetron" refrigerants:

SELECT THE RIGHT MOTOR FOR THE JOB.

When servicing air conditioning or refrigeration equipment, if you find a motor needs to be replaced, always try to use an exact type motor for replacement. Never attempt to use a motor of the same horsepower but of another type, as it may not perform properly. Don't risk substitutions!

There are many variations in specifications in types and makes. Some examples of the differences in single phase, 1-hp. motors are:

1. Single phase capacitor start—high torque and normal starting current.

2. Single phase split phase—low starting torque and high starting current.

3. Single phase repulsion start—high starting torque, low starting current.

Each of these three differently designed motors has special applications and may not always be interchangeable.

Likewise, three-phase motors are designed under many different specifications for certain applications.

If in doubt about any motor, check with the manufacturer.

THREE-PHASE MOTOR PROTECTION

It is common to protect with overload relays only two of the three phases in polyphase installations. Authorities dispute the need for a third overload relay on the remaining phase.

Thorough examination of the situation reveals that, while the rate of incidence is low, there are conditions which are not protected against with two-phase protection.

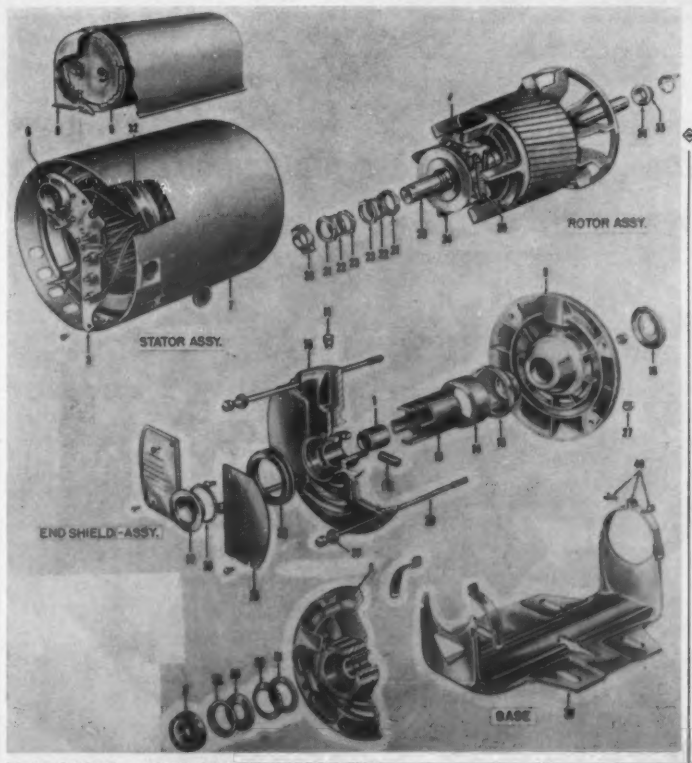
According to one authority, the most talked about situations in which two overload protectors would prove inadequate involve motors fed from either delta-Y or Y-delta transformers having isolated neutrals. In this type of application, the current in one phase of the motor could be as much as twice that in the other two phases if one primary line of the transformer is opened by fuse action or other cause. "If the phase with the high current is not one of the two protected by standard overload protection," warns R. A. Gerg, Allis-Chalmers Mfg. Co., "the motor phase winding will be damaged.

"With the same transformer connection but with a delta or Y-motor at standstill, the locked rotor current in one phase through the motor control would be 100% of normal 3ϕ locked rotor current, while the other two-phase lines would carry only 50% of normal 3ϕ locked rotor current. With high current in the unprotected line, the motor overloads would not operate fast enough to protect the motor."

Discussing other possible problems with an unprotected phase, Gerg suggests that for complete motor protection, three overload protectors be specified when 1) the motor is driving vital equipment; 2) the motor is unattended; 3) Y-delta or delta-Y transformers supply the motor; 4) the transformer connections are not known; 5) motors are operated in parallel with other motors or loads which might cause phase unbalance; 6) local electrical codes require.

file guide—ELECTRICITY: Motors

Next: MOTOR STARTERS



RELATIONSHIP AMONG SEVERAL MOTOR TYPES can be seen from this exploded view of a capacitor start motor. According to G-E, the removal of items 5 and 8 (capacitor and cover) converts the motor into a split-phase motor. The removal of 5 and 8 and of 3, 4, 6, 24, and 25 (switch, centrifugal mechanism, overload protector, push collar for centrifugal mechanism, and spring for centrifugal mechanism) makes the unit a 3-phase motor.

Westernaire
IS UNFAIR TO
OTHER MANUFACTURERS

We build private brand air conditioning and refrigeration equipment for several hundred accounts, better and at less cost than they can do it for themselves.
"Why don't you get the whole story?"

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315 West Third Box 784
HUTCHINSON, KANSAS

Holly-General Establishes New Sales Districts for Expanding Distribution

PASADENA, Calif. — The Siegler Corp.'s Holly-General Div. has established four new sales districts to handle the expanding distribution of the company's products, it was announced by Robert K. Miller, president of Holly-General.

A vice president has been appointed to head each of the new district sales offices located in Dallas, San Francisco, Los Angeles, and San Diego, Miller said.

Leroy D. Nutter will be in charge of the Dallas office which covers Texas, Oklahoma, New Mexico, Louisiana, Arkansas, Mississippi, Alabama, western Tennessee, Nebraska, Kansas, Iowa, and Missouri.

Heading the San Francisco district office is Earl C. Hefner. This district encompasses northern California, Oregon, Washington, Idaho, Montana, and northern Nevada.

The Los Angeles district, which includes southern California, southern Nevada, Colorado, Wyoming, and Utah, will be under the direction of John F. Droge.

Jackson L. Garner will be vice president in charge of sales for San Diego County and Arizona.

Holly-General, with plants in Pasadena and Burbank, Calif., produces wall furnaces, central forced air heating, water heaters, and air conditioners, it was stated.

Service Diagnosis for a Complex System

Part 4

The complex air conditioning system designed to provide conditions vital in the test launching of the Titan Intercontinental Ballistic Missile was described in the May 25, 1959 issue of the NEWS.

Because of its important function, an operations manual was prepared giving explicit instructions on its operation and maintenance. Since proper diagnosis of service problems is so important in this system, the NEWS believes the "Trouble Diagnosis" Chart for the system will be of interest and assistance to all those who service any type of air conditioning system. This is the final part of the series.

For a better understanding of the "Trouble Diagnosis Chart," a brief description of the system will be useful.

The system is designed to dehumidify the air by cooling it to -10° F. or 40° F. as required, using mechanical refrigeration. The air is then reheated to 40° F. for use for cooling or heated to 120° F. for use in heating when the ambient temperature is below 40° F.

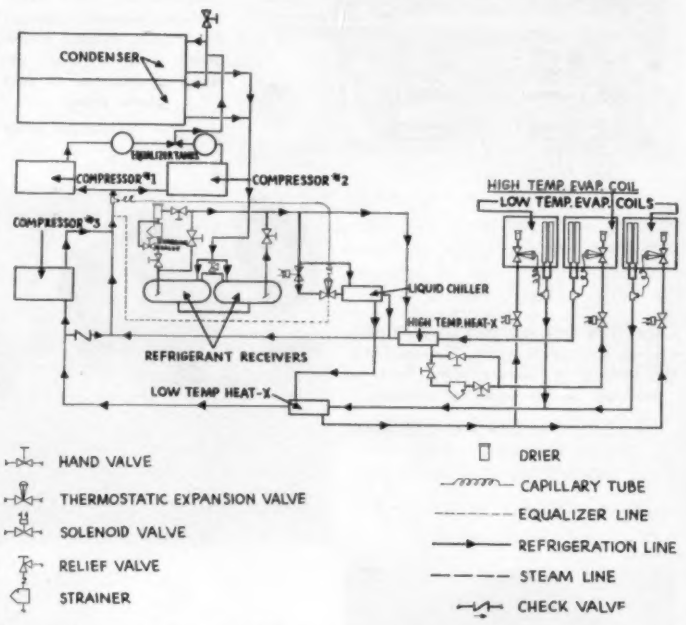
Flow of air is automatically controlled at 180 lbs./min. of recirculated air plus 70 lbs./min. of fresh air. A manual adjustment located on the instrument panel permits pre-selection of any other proportion of air.

Cooling effect is supplied by a two-stage refrigerant system, composed of one 12-cylinder low-stage compressor, directly connected to a 50-hp. motor, and two 8-cylinder high temperature compressors each directly connected to a 60-hp. electric motor.

Other parts of the assembly include a 12-ton liquid cooler, a two-section air-cooled condenser mounting four 47-in. 4-blade propeller fans belted to two 10-hp. electric motors.

Prime air mover is a 60-hp. direct-drive positive-pressure blower selected to move 250 lbs. of air/min. against a 40-in. water external static pressure.

The coil section includes a cooling evaporator section containing two 16-row low temperature coils and one 12-row high temperature coil together with an air diverter valve, three expansion valves, and a two-row steam heat and reheat coil. Heat is supplied by an electrically fired steam generator designed to heat 175 lbs. air/min. from -20° F. to 120° F.



COOLING CYCLE CIRCUIT and valving for the complex air conditioning system used for test launchings of "Titan" missile is shown in the above drawing.

* * *

MISCELLANEOUS TROUBLES

Observation	Possible Cause	Remedy
q. Oil pressure lower than normal or no oil pressure	Low oil charge	**Add oil**
	Faulty oil gauge	**Check and replace**
	Defective oil pressure regulator	**Repair or replace**
	Clogged oil suction strainer	**Clean**
	Broken oil pump tank	**Replace pump assembly**
	Clogged oil line	**Remove obstruction**
	Worn oil pump	**Replace pump assembly**
	Worn compressor bearings	**Replace**
t. Cold compressor	Liquid carrying over from evaporator	**Check refrigerant charge and expansion valves**
u. Low crankcase oil	Oil return check valve stuck closed	**Repair or replace**
v. Cylinders and crankcase sweating	Too much oil in circulation	**Remove oil from compressor**
	Floodback	**Check refrigerant charge and expansion valves**
w. High crankcase temperature (should be 105° F.–212° F. at seal housing)	Liquid line strainer clogged	**Clean**
	Excessive superheat	**Reset expansion valves**
	Leaking suction or discharge valves	**Replace**

(The End)

Special bronze alloy construction —high resistance to corrosion and fatigue
Gas tight under prolonged vibration—minimize noise
Absolutely free of contaminating foreign matter—furnished in air-tight polyethylene bag
Standard of the industry as original equipment — U. L. listing for sizes 3/16" through 1½"... both high and low service

ALSO AVAILABLE Flexonics synthetic Freon-resistant hose for refrigeration and air conditioning service.

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The original and sure way to effective vibration and noise control in compressor piping.

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A.O. Smith has the horses!

800 to 1 hp favorites for quiet operation, low maintenance and long-life service . . .

From the case of the A. O. Smith Motor Man — a complete stable of integrals that include single-phase models (1-5 hp) or polyphase (1-800 hp). Also a team of fractional-hp motors. All are sure bets to give top performance over the long, long haul.

And there's an A. O. Smith Motor Man near you — chomping at the bit to give you 24-hour action on all parts and service orders.

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Milwaukee 1, Wisconsin, U.S.A.

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NEWS' CLASSIFIED ADS

Automobile Air Conditioner Sales by Regions 1958-1959

Region	% of Total Sales	Unit Sales	% of Total Sales	Unit Sales
Southwest	49.8	287,576	54.1	207,672
Southeast	19.6	113,182	18.7	71,783
Midwest	12.1	69,873	12.8	49,135
West	14.9	86,041	10.2	39,154
Northeast	3.6	20,789	4.2	16,123
TOTALS	**100.0**	**577,461**	**100.0**	**383,867**
Exports	N.A.	3,260	N.A.	N.A.

* * *

1959 Auto Air Conditioner Sales--

(Continued from Page 1, Col. 5)

on a percentage basis. Among the independents Frigikar and Mark IV upped their volume strongly. Novi suffered from a crippling strike and relocating its factory in Los Angeles, while Frostemp Div., Lindustries, Inc., Eaton Mfg. Co., and Auto Temp, Inc. started late in the season so that their full sales potential was not achieved.

Listed in another table is a regional breakdown of 1959 and 1958 sales. It is apparent that the sales increase was not on a regional basis, but came from everywhere except the Northeast, traditionally poor ground for air conditioning sales. However, the Southwest is still head and shoulders ahead of the rest of the country with almost 50% of total sales.

In view of good 1959 sales and the anticipated increase in automobile sales, all manufacturers are looking for sizable increases in 1960 sales. Consensus seems to be that 1960 will see 700,000 auto units installed.

Electric House Heating Meeting--

(Continued from Page 1, Col. 3)

naces, according to various exhibitors.

Estimating that there are now about 850,000 electrically heated homes in the U.S., NEMA estimates at least 100,000 more will be added this year, according to C. F. Kreiser of the Edwin L. Wiegand Co., chairman of the NEMA section.

"We predict that, at the end of this decade, we will have 6,000,000 electrically heated homes in the U.S.," Kreiser added. "Of this number, we estimate that 3,000,000 will be new homes. The other 3,000,000 will be converted to electric heating from coal, oil, and gas-fired furnaces.

"In addition, our industry is confident that 1970 will see the beginning of an era when 50% of all new homes will be electrically heated," Kraiser declared.

"Sometime in the late 60's electric heating (not counting heat pumps) will become a billion dollar a year industry," it was also predicted by Stanley B. Aronson, sales manager of Berko Electric Mfg. Corp. and general chairman for the symposium and exposition.

A proposed new "All-Weather Comfort Standard" for electrically heated and air conditioned homes was also announced at the exposition, as was a new performance standard developed by the National Mineral Wool Association.

The proposed comfort standard sets up several requirements, including a maximum summer heat gain of 25 B.t.u.h. per square foot of floor area of air conditioned homes, and "U" values of 0.05 for ceilings and 0.07 for frame walls and floors over vented spaces.

This standard was developed by a group of utilities and manufacturers of air conditioning and heating equipment, insulation, and glass. It is being submitted to numerous trade groups and individual manufacturers for their acceptance.

Tied into this development are the new performance standards of the National Mineral Wool Association. This converts "U" values into equivalent "R" (resistance) numbers. The "U" value of 0.05, for example, equals "R 20."

Insulation will be stamped with an "R" number, which is expected to simplify the problem of specifying and selecting insulation to meet requirements. It will further probably do away with the general approach of specifying just thickness of insulation, which often disregards the actual values of different types of insulating material as ultimately installed.

Correction

General Electric Co. Air Conditioning Dept. reports that the capacity of its Model TE72BH blower evaporator unit is 72,000 B.t.u.h. rather than 77,000 B.t.u.h. listed in the 1960 specifications section of the March 7 issue of the NEWS.

"Corrosion." By Frank J. Versagi—50¢ each.

Get your copy Mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort St., Detroit 26, Mich.

Temp-O-Matic Affair To Introduce Capitolaire Cooling, Heating Line

BROOKLYN—Temp-O-Matic, Inc., metropolitan distributor for Crane Co. air conditioning products, will hold an open house March 31 to introduce the "Capitolaire" line of cooling and heating equipment.

The showing will feature the new National-U.S. products, and the distributor staff will outline its estimating and layout service and a new financing plan for dealers, states R. A. Brown, president of Temp-O-Matic.

Table 1—Estimates of Automobile Air Conditioner Sales by Manufacturer

INDEPENDENT MANUFACTURERS

	1959	1958	1957
A.R.A. Mfg. Co.	24,700	23,591	15,100
Clardy Auto A.C. Co.	8,700	6,500	6,800
Climatic Air Sales Co.	6,000	3,500	2,000
Eaton Mfg. Co.	2,850	N.A.	N.A.
Frigikar Corp.	30,066	21,652	22,100
Parkomat Sales Co.	8,000	7,500	7,850
Sears, Roebuck & Co.	5,600	5,000	3,500
*Mark IV Div., J. E. Mitchell Co., Forston Co., International Auto Air Cond. Co., Kauffman Air Cond. Co.	54,361	28,483	22,900
†Others	17,350	46,430	62,080
Total	**157,627**	**142,656**	**142,330**

*Reported jointly by Automotive Air Conditioning Manufacturers Association.

†In 1959: Auto-Temp, Inc.; Capitol Refrigeration, Inc.; Cartrol Corp.; Frigiquip Corp.; Kool Engineering Corp.; Frostemp Div., Lindustries, Inc.; Novi Sales Co.; Mobil Air Mfg. Co.

AUTOMOBILE MANUFACTURERS

	1959	1958	1957
General Motors			
Buick	27,116	29,596	35,000
Cadillac	54,015	41,804	46,476
Chevrolet	79,218	40,000	38,000
Pontiac	37,279	9,000	12,360
Oldsmobile	63,100	40,093	38,933
Chrysler Corp.			
Chrysler, Imperial	13,754	11,270	19,429
DeSoto	3,488	2,900	6,102
Dodge	6,833	6,100	8,674
Plymouth	9,770	7,700	10,415
Ford Motor Co.			
Ford Div.	78,491	26,984	17,000
Lincoln-Mercury Div.	35,000	19,346	24,213
American Motors	14,358	6,237	6,301
Studebaker Corp.	672	181	171
Total	**423,094**	**241,211**	**263,074**
GRAND TOTAL	**580,721**	**383,867**	**405,404**

The new 1960 MARK IV
Monitor
MARK IV backs you with a national service organization.
Factory trained servicemen coast to coast . . . almost 2,000 outlets in 48 states. Regional factory service schools each year. Generous warranty, but claims are comparatively rare because . . .
MARK IV backs you with a soundly engineered, dependably built unit.
By actual test MARK IV delivers more cold air, gives quicker cool-down than any other unit . . . including factory installations. This progressive company has an old fashioned feeling that its reputation rides with every unit.
MARK IV backs you with the most complete set of sales aids in the industry.
Literature that projects quality. Co-op ad program. Point-of-purchase signs and displays of every sort.
WRITE FOR INFORMATION ABOUT A MARK IV DISTRIBUTORSHIP.
MARK IV DIVISION
JOHN E. MITCHELL COMPANY
3800 COMMERCE STREET
DALLAS, TEXAS

ARI's Report on Unitary Air Conditioner Sales for 1959

ARI Unitary Air-Conditioner Section's Report Of Manufacturers' Shipments January-December, 1959 (12 months)

Description of Product		Total Shipments In Units (By Condenser-type) Air or Evaporatively Cooled	Water Cooled	Total	% Change from 1958
AIR CONDITIONERS (except window and wall types)					
	Horizontal				
SELF-CONTAINED (Integral-Condenser Type) (1)	Under 27,000 B.t.u./hr.	18,343	18	18,361	+ 19
	27,000-32,999 B.t.u./hr.	1,717	1	1,718	— 48
	33,000-41,999 B.t.u./hr.	18,073	248	18,321	+ 65
	42,000-53,999 B.t.u./hr.	2,131	11	2,142	+1398
	54,000-64,999 B.t.u./hr.	519	572	1,091	0
	65,000-96,999 B.t.u./hr.				
	Other Than Horizontal				
	Under 27,000 B.t.u./hr	4	179	183	— 85
	27,000-32,999 B.t.u./hr.	....			
No. of Companies	33,000-41,999 B.t.u./hr.	7	6,251	6,258	+ 11
1959 — 49	42,000-53,999 B.t.u./hr.	41	8,382	8,423	— 15
1958 — 48	54,000-64,999 B.t.u/.hr.				
	65,000-96,999 B.t.u./hr.	14	7,405	7,419	+ 6
	All				
	97,000-134,999 B.t.u./hr.	55	6,803	6,858	0
	135,000-184,999 B.t.u./hr.	69	3,689	3,758	— 4
	185,000-249,999 B.t.u./hr.	70	1,888	1,958	— 13
	250,000-319,999 B.t.u./hr.	28	1,499	1,527	+ 14
	320,000-379,999 B.t.u./hr.	18	1,014	1,032	+ 76
	380,000 B.t.u./hr. & over	66	237	303	+ 57
	Total	**41,155**	**38,197**	**79,352**	**+ 13**
	Under 27,000 B.t.u./hr.	231		231	— 32
REMOTE-CONDENSER TYPE (2)	27,000-32,999 B.t.u./hr.				
	33,000-41,999 B.t.u./hr.	280		280	— 62
	42,000-53,999 B.t.u./hr.	543		543	— 3
	54,000-64,999 B.t.u./hr.	780		780	— 35
	65,000-96,999 B.t.u./hr.	1,375		1,375	+ 30
	97,000-134,999 B.t.u./hr.	919		919	+ 35
	135,000-184,999 B.t.u./hr.	785		785	+168
No. of Companies	185,000-249,999 B.t.u./hr.	297		297	
1959 — 14	250,000-319,999 B.t.u./hr.				+365
1958 — 19	320,000-379,999 B.t.u./hr.	256		256	
	380,000 B.t.u./hr. & over				
	Total	**5,466**	....	**5,466**	**+ 10**
	Under 27,000 B.t.u./hr.	673	198	871	
REFRIGERATION CHASSIS (3)	27,000-32,999 B.t.u./hr.	196	617	813	— 43
	33,000-41,999 B.t.u./hr.				
	42,000-53,999 B.t.u./hr.	....			
No. of Companies	54,000-64,999 B.t.u./hr.	....	504	504	— 20
1959 — 10	65,000-96,999 B.t.u./hr.	....			
1958 — 13	97,000 B.t.u./hr. & over	....			
	Total	**869**	**1,319**	**2,188**	**— 39**
YEAR-ROUND AIR CONDITIONERS (except heat pumps)					
SELF-CONTAINED AND REMOTE-CONDENSER TYPE (4)	Under 27,000 B.t.u./hr.	149	323	472	— 59
	27,000-32,999 B.t.u./hr.	....			
	33,000-41,999 B.t.u./hr.				
	42,000-53,999 B.t.u./hr.				
	54,000-64,999 B.t.u./hr.	453	10,256	10,709	+ 14
No. of Companies	65,000-96,999 B.t.u./hr.				
1959 — 9	97,000 B.t.u./hr. & over		....		
1958 — 10	**Total**	**602**	**10,579**	**11,181**	**+ 6**
HEAT PUMPS (except room air conditioners)					
	Under 27,000 B.t.u./hr.	8,663		8,663	+192
SELF-CONTAINED (5)	27,000-32,999 B.t.u./hr.	1,197		1,197	
	33,000-41,999 B.t.u./hr.	10,968		10,968	+100
	42,000-53,999 B.t.u./hr.	1,167		1,167	
No. of Companies	54,000-64,999 B.t.u./hr.				
1959 — 19	65,000-96,999 B.t.u./hr.	893		893	+ 53
1958 — 15	97,000 B.t.u./hr. & over				
	Total	**22,888**	....	**22,888**	**+124**
	Under 27,000 B.t.u./hr.	1,635		1,635	— 47
OTHER THAN SELF-CONTAINED (6)	27,000-32,999 B.t.u./hr.				
	33,000-41,999 B.t.u./hr.	3,589		3,589	+ 58
	42,000-53,999 B.t.u./hr.	3,267		3,267	
No. of Companies	54,000-64,999 B.t.u./hr.	2,446		2,446	+705
1959 — 17	65,000-96,999 B.t.u./hr.	1,342		1,342	+424
1958 — 7	97,000 B.t.u./hr. & over				
	Total	**12,279**	....	**12,279**	**+ 54**
SPLIT SYSTEMS					
	Under 27,000 B.t.u./hr.	17,371	38	17,409	+110
AIR CONDITIONING CONDENSING UNITS (7)	27,000-32,999 B.t.u./hr.	16,458	207	16,665	+ 57
	33,000-41,999 B.t.u./hr.	55,209	280	55,489	+ 80
	42,000-53,999 B.t.u./hr.	20,029	269	20,298	+118
	54,000-64,999 B.t.u./hr.	25,536	469	26,005	+ 63
	65,000-96,999 B.t.u./hr.	11,289	209	11,498	+ 47
No. of Companies	97,000-134,999 B.t.u./hr.	4,387	103	4,490	
1959 — 55	135,000-184,999 B.t.u./hr.	664	63	727	+139
1958 — 36	185,000 B.t.u./hr. & over				
	Total	**150,943**	**1,638**	**152,581**	**+ 80**
	Under 27,000 B.t.u./hr.			1,241	+ 37
AIR CONDITIONING COILS WITH BLOWER (8)	27,000-32,999 B.t.u./hr.			939	+119
	33,000-41,999 B.t.u./hr.			6,512	+ 92
	42,000-53,999 B.t.u./hr.			5,199	
	54,000-64,999 B.t.u./hr.			8,926	+ 56
	65,000-96,999 B.t.u./hr.			6,811	+ 66
No. of Companies	97,000-134,999 B.t.u./hr.			4,798	
1959 — 41	135,000-184,999 B.t.u./hr.			762	+288
1958 — 26	185,000 B.t.u./hr. & over				
	Total			**35,183**	**+ 88**
	Under 27,000 B.t.u./hr.			12,473	+ 43
AIR CONDITIONING COILS WITHOUT BLOWERS (9)	27,000-32,999 B.t.u./hr.			9,062	+122
	33,000-41,999 B.t.u./hr.			43,940	+108
	42,000-53,999 B.t.u./hr.			17,609	
	54,000-64,999 B.t.u./hr.			18,398	+ 65
	65,000-96,999 B.t.u./hr.			7,399	
No. of Companies	97,000-134,999 B.t.u./hr.			305	+ 47
1959 — 45	135,000-184,999 B.t.u./hr.				
1958 — 26	185,000 B.t.u./hr. & over			....	
	Total			**109,186**	**+ 87**
GRAND TOTAL (excluding coils)		**234,202**	**51,733**	**285,935**	**+ 49**

Reporting Companies: Airtemp Div., Chrysler Corp.; Amana Refrigeration, Inc.; American Furnace Co.; American-Standard Air Conditioning Div.; American-Standard Industrial Div.; Arkla Air Conditioning Corp.; Armstrong Furnace Co.; Carrier Corp. (incl. all mfg. div.); Cleveland Steel Products Corp.; Cobell Industries, Inc. (beg. with July); Coleman Co., Inc., The; Columbia Specialty Co., Inc.; Continental Mfg. Co.; Coolerator Div., McGraw-Edison Co.; Curtis Mfg. Co. Fedders Corp.; Florida Warren Corp.; Forston Co.; Fraser & Johnston Co. (beg. with May); Frick Co., Inc.; Friedrich Refrigerator, Inc.; Frigidaire Div., General Motors Corp.; Gaffers & Sattler Div., Utility Appliance Corp.; General Electric Co.; Grove Furnace Co., Inc.; Hall-Neal Furnace Co.; Heat-X, Inc. (beg. with August); Heil-Quaker Corp.; Holly-General Co.; Hupp Corp.: Gibson Refrigerator Div. (January-March); Perfection Div.; Typhoon Air Conditioning Div.; Typhoon Heat Pump Div.

As reported in the March 21 issue Manufacturers' shipments of unitary air conditioners for 1959 totaled 285,935 for a gain of 49% over the previous year, according to figures released by ARI. The figures include unitary heat pumps, but do not include room air conditioners, reversible or otherwise.

International Heater Co.; Iron Fireman Mfg. Co.; Janitrol Heating & Air Conditioning Div.; Lennox Industries, Inc.; Majestic Co., Inc., The; Mathes Co., The (beg. with April); Miami Products, Inc.; Mueller Climatrol Div. of Worthington Corp.; National Thermatic Corp. (beg. with April); National-U. S. Radiator Corp.; Olsen Mfg. Co., The C. A.; Peerless Corp.; Philco Corp.; Rheem Mfg. Co.

Smith Corp., The A. O.; Southwest Mfg. Co.; Stewart-Warner Corp., U. S. Machine Div.; Thatcher Furnace Co.; Therm-Air Mfg. Co. (beg. with June); Trane Co., The; Tuck-aire Furnace Co.; United States Air Conditioning Corp.; Westinghouse Electric Corp.; Whirlpool Corp.; Williamson Co.; Worthington Corp.; York Div. of Borg-Warner Corp.

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POSITIONS WANTED

NEED A "live-wire" to head up your Sales? Top sales management executive (seasoned by 12 years in air conditioning and refrigeration at sales and application levels), plus broad experience in sales, marketing, manufacturing, contracting of built-to-order and packaged equipment. Write: BOX A6508, Air Conditioning, Heating & Refrigeration News.

A GRADUATE engineer in refrigeration and air conditioning design wishes position in consulting or design engineering. 7 years in refrigeration and air conditioning field. Technical background includes: truck refrigeration, refrigerators, window units auto, and other air conditioning. Not afraid of work. Recommendation upon request. Write: BOX A6515, Air Conditioning, Heating & Refrigeration News.

ATTENTION AIR conditioning dealers and distributors. Do you need a first class serviceman? Expert on controls. Knows all phases of heating and air conditioning. Past ten years service and construction supervisor for a large Carrier distributor. Age 39, married, willing to relocate, available soon. BOX A6520, Air Conditioning, Heating & Refrigeration News.

POSITIONS AVAILABLE

REFRIGERATOR CABINET Engineer required for home freezer department. Must be familiar with production techniques in metal fabricating industry, tooling and materials used in refrigerators and freezers. Three to five years' experience preferred. State qualifications and salary requirements. All replies held in strictest confidence. Write, phone or wire information to Bryan E. Thompson, Personnel Director, Food Freezer Division, CARRIER CORPORATION, P. O. Box 2010, Tyler, Texas.

RESEARCH ENGINEER — Refrigeration. Excellent opportunity for a man with initiative and creative ability in the arrangement of refrigeration systems and related problems in the development of vending machines. Very good salary and benefit program with an outstanding company. All replies are confidential; all responses will be answered. Please write or contact Maurice Udell, Personnel Department, THE VENDO COMPANY, Kansas City 26, Missouri.

SERVICE SUPERVISOR to represent air conditioning manufacturer in metropolitan Los Angeles area. Job qualifications include technical competence on installation, operation and maintenance of full line of air conditioning equipment, proven training ability, and good commercial judgment. Send brief resume to: WESTINGHOUSE ELECTRIC CORPORATION, Air Conditioning Division, 1515 So. Garfield Avenue, Los Angeles 22, California.

SMALL MANUFACTURER of heat pumps (located in Los Angeles) has immediate opening for potential general manager. This position with a financially sound company represents a great challenge with commensurate salary opportunities. Write: BOX A6471, Air Conditioning, Heating & Refrigeration News.

SERVICEMAN FOR large Los Angeles firm. Experienced in all phases of commercial refrigeration and air conditioning. Year-round employment. Top pay and vacation. BOX A6505, Air Conditioning, Heating & Refrigeration News.

SERVICE ENGINEERS—Major organization has openings along Eastern seaboard for top flight air conditioning service and installation men. Only heavy experience with industrial equipment and control systems considered. Top rates with excellent opportunities to advance to management. Replies confidential, submit full details of experience to: BOX A6506, Air Conditioning, Heating & Refrigeration News.

SHOP SUPERINTENDENT wanted by Florida manufacturer of quality heating and air conditioning equipment. First class assembly line production man capable of expediting construction and ability handle employees—must be cost conscious. Small but fast growing corporation with unlimited potential. Opportunity to advance—salary open. Send complete background, age, education, etc. to: BOX A6516, Air Conditioning, Heating & Refrigeration News.

REFRIGERATION SERVICE Manager wanted by old established Florida contractor. Must be capable of servicing all types of heating and air conditioning equipment, organizing and operating service department at profit and handling customer relations. Send complete resume of education, age, experience, and reference to: BOX A6517, Air Conditioning, Heating & Refrigeration News.

AIR CONDITIONING Sales Engineer wanted by well-established Florida contractor handling highest quality equipment for past 15 years. Must be graduate Mechanical Engineer, pleasing personality, capable of selling quality installations. Earnings limited only to ability and initiative. Send resume, photo, complete details to: BOX A6518, Air Conditioning, Heating & Refrigeration News.

SERVICEMAN WANTED for well-established Midwest firm. Experienced in all phases of commercial refrigeration and air conditioning. Year round employment. Minimum 40 hour week. Write: BOX A6519, Air Conditioning, Heating & Refrigeration News.

EQUIPMENT FOR SALE

SPECIAL ANNOUNCEMENT, available now—replacement valve plate kits for hermetic units. Tecumseh compressors —⅛, ⅙, ⅛, ¼, ⅓ h.p. Also, pancake 1/10, ¼ h.p. Replacement valve plate kits for other model hermetic units to follow. Write for information or see your local wholesaler. CHICAGO VALVE PLATE & SEAL CO. - 6960 W. Grand, Chicago 35, Illinois.

ATTENTION REFRIGERATION Servicemen: Send for catalog listing values in refrigeration and air conditioning parts, relays, capacitors, compressors. Savings up to 50%. WALTER W. STARR, 2833 Lincoln Ave., Chicago 13, Illinois.

CLOSEOUT, 75 units, popular make complete dehumidifier chassis, from service stock, consists of P91 pancake compressor, pancake condenser and evaporator coil, blower motor assembly, cord ready plug in. Order now—$32.50 each. Check with order. SURPLUS SPECIALTIES SALES CO., 1208 Webster Ave., Chicago 14, Illinois.

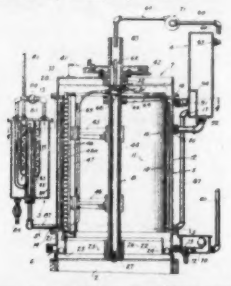
BUSINESS OPPORTUNITIES

REFRIGERATION BUSINESS for sale.—Located in Western town on main cross country highway #80 (Phoenix to Los Angeles). Fast growing area. $4000 will handle business and property, including residence. Write to: BOX A6521, Air Conditioning, Heating & Refrigeration News.

PATENTS

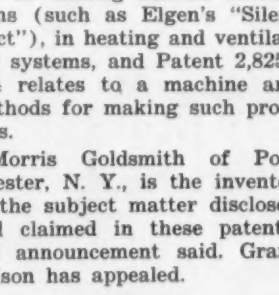
Week of Nov. 3 (Concluded)

2,910,841. EVAPORATOR FOR FREEZER MECHANISMS. Lyle E. Branchflower, Seattle, Wash.



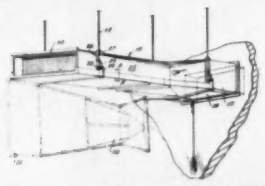
1. An ice making machine comprising an upright first substantially cylindrical shell for forming ice on the inner surface thereof; an upright second substantially cylindrical shell surrounding said first shell, the diameter of the inner surface of the first shell being a plurality of times greater than the distance between the first and second shells. . . .

2,910,926. DUCT UNIT FOR AN AIR CONDITIONING SYSTEM. Bernard E. Curran, Sewickley, Pa., assignor to H. H. Robertson Co., Pittsburgh, Pa.



1. A connecting duct for use in connecting an air discharge outlet to an air supply duct comprising an elongated hollow duct section provided with upper and lower outwardly extended flanges at the top and bottom of the section, said connecting duct being made in two identical longitudinally extended half section. . . .

2,911,011. HUMIDIFYING APPARATUS. William M. Niehart, Los Angeles, Calif.

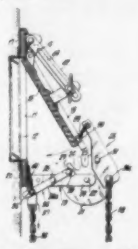


1. In a forced draft humidifying unit in the form of an exposed elevated horizontal duct of venturi construction having top and side walls, the combination therewith of: a bottom member having upturned flanges along its opposite longitudinal sides to overlap the outer surfaces of the lower margins of said side walls, said bottom member being hingedly mounted to swing downward to one side for cleaning operations; longitudinal horizontal flanges extending inward from said side walls adjacent said bottom member. . . .

Editor's Note: Patents described here have been selected from the "Official Gazette" of the United States Patent Office. They offer only a brief summary of each invention. In some instances only the first part of the digest is presented.

Printed copies of patents, reissued patents, and patent designs may be secured from the Patent Office; patents and reissues are 25¢ each, while designs are furnished at 10¢ each. Address orders to: Commissioner of Patents, Washington 25, D. C.

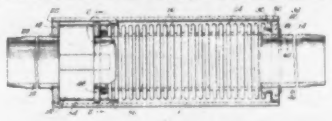
2,910,927. MEANS FOR CONTROLLING AIR FLOW FROM A WALL DUCT. Irving Frederick Barnwell, Baisley Park, N. Y.



1. A device for the control of the flow of air into a room from a duct in a wall comprising a rectangular frame secured to the wall around the duct having a door hinged on a horizontal axis to the upper horizontal panel of the frame, a horizontal support having its outer end forked extending into the room from and at right angles to the lower panel of the frame. . . .

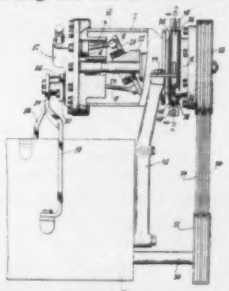
2,911,238. EXPANSION JOINT HAVING ADAPTOR MEMBER MOUNTED BELLOWS SEALING MEANS. Kenneth H. Myers, West Dundee, James W. Farmer, Elgin, and La Verne P. Briesch, West Dundee, Ill., assignors to Flexonics Corp., Maywood, Ill.

1. An expansion joint comprising first and second generally axially aligned opposite end pipe means, a ring member receiving and annularly welded and sealed to said first pipe means, a sleeve having one end annularly welded and sealed to an outer margin of said ring member, said sleeve including a portion loosely telescoping over said second pipe means, a sheet metal annular adaptor member having a first cylindrical portion within and secured to and sealed to an opposite end of said sleeve by a weld. . . .



2,911,170. REFRIGERATING APPARATUS. Robert Galin and Allen L. Everitt, Dayton, Ohio, assignors to General Motors Corp.

1. A shock absorbing mounting arrangement for a rotary machine having a driving pulley at one end thereof comprising, an annular resilient member engaging said machine at a point located between said pulley and the center of gravity of said machine, means connecting said resilient member with a support, said resilient member forming a shock absorbing connection between said machine and said support, a resilient block having an adjacent end thereof secured to said machine at an end of said machine opposite from said pulley and extending axially of said machine, and means connecting the end of said block opposite from said machine with said support to provide a shear type supporting arrangement.



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Elgen Says Court Upholds Validity Of Its 2 Patents

LONG ISLAND CITY, N. Y. —Elgen Mfg. Corp. announced at its general offices here that a U. S. District Court decree was entered on Feb. 17, 1960, at Chicago, by Federal Judge Joseph Samuel Perry, holding U. S. Patents 2,777,573 and 2,825,384, both of which are owned by Elgen, valid and infringed by Grant Wilson, Inc. of Chicago.

Patent 2,777,573 relates to a prefabricated coiled product for use in making flexible connections (such as Elgen's "Silent Duct"), in heating and ventilating systems, and Patent 2,825,384 relates to a machine and methods for making such products.

Morris Goldsmith of Port Chester, N. Y., is the inventor of the subject matter disclosed and claimed in these patents, the announcement said. Grant Wilson has appealed.

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Piped Heating--

(Continued from Page 1, Col. 1)

to all members of the piped heating industry, the program has been approved by the board of directors of BHC and the JIPC membership.

A first mailing of factual data to explain the claims made for electric heating efficiency in schools has already been distributed to members of the two groups, it was noted.

The national BHC is made up of 42 companies and trade associations who manufacture, distribute, and install hydronic heating and cooling equipment.

The JIPC is comprised of the National Association of Plumbing Contractors, Mechanical Contractors Association, National Lead Burning Association, Refrigeration & Air Conditioning Contractors Association, the United Association, and other contractor associations. Of the foregoing, the UA, NAPC, and MCAA are also members.

As outlined by Greene, the cooperative program embodies three component phases: 1) industry-wide market research, 2) publicity and promotion, and 3) distribution of technical data and sales tools to industry members.

The over-all program will be administered by P. D. Grewer, manager of the new Commercial & Industrial Div. of BHC. Guidance for each individual phase will be provided by representatives of BHC member associations and manufacturers serving on special committees.

"The research program, already under way, is investigating all aspects of competitive electric heating techniques," it was pointed out. "Technical data is being collected and evaluated to provide effective data reports on installation, operating, and other costs of heating buildings.

"Also, sales tools and publicity specifically for architects, engineers, and realtors are being prepared for distribution.

"Data compiled on electric heat will be utilized by both the Commercial & Industrial and Residential Divisions of BHC.

"To make the market research program as comprehensible as possible, a special Task Force is working closely with all BHC members, contractor associations, manufacturers, and allied fuel associations and industry groups."

The publicity program, stated Greene, is carried by news stories and technical articles explaining the special advantages of hydronic heating and cooling systems for architectural, educational, and other appropriate professional trade and technical publications.

Non-technical material will also be prepared and directed to newspapers, radio stations, and other consumer media for women's page, school, real estate, financial, and other sections.

Coordination in disseminating hydronic promotional material to all JIPC-BHC members, manufacturers' salesmen, local BHC Councils, and all allied organizations will be accomplished through the program.

See Stronger Campaign as UA Joins BHC

NEW YORK CITY — The Better Heating-Cooling Council announced that the hydronic industry's drive to promote sales and develop new markets for its heating and cooling products and services "was powerfully augmented by the decision of the United Association to become a member" of the council, industry marketing-promotion organization.

The UA is the national labor organization of the steamfitting and pipefitting trades.

By its decision, the 247,000-member UA rounds out the national-local united-industry support of the BHC drive, the council said.

ASHRAE Meeting Set for June 13-15

NEW YORK CITY—The 67th annual meeting of the American Society of Heating, Refrigerating & Air-Conditioning Engineers, Inc. will be held in Vancouver, B. C., June 13-15.

The three-day program will include four technical sessions on topics allied with absorption air conditioning, refrigerants, thermoelectric effects, and heating.

There will be three symposiums covering domestic refrigerator engineering, commercial refrigeration, and air conditioning.

The forums will, as usual, relate to immediate industry problems.

Headquarters for the meeting will be at the Vancouver hotel, according to the announcement.

Cory-Mitchell Suit Settled--

(Continued from Page 1, Col. 2)

ing of the board of directors on March 16. It provides for a reduction of $1 million in the purchase price paid by Cory for the common stock of Mitchell.

"The settlement results in your company receiving $675,000 in cash, and the balance of $325,000 is evidenced by notes, $300,000 of which are collateralized, and all are payable within three years," Alsdorf reported.

"As of Feb. 29, 1960, the net worth of your company, after reflecting the above settlement, is approximately $5,400,000, or $8.35 per share, on the 646,250 shares of Cory common stock outstanding.

Settlement of the lawsuit followed a trial in the Superior Court of Cook County, Ill. As reported earlier in the NEWS, a Superior Court opinion recently held that Bernard A. Mitchell and other former Mitchell stockholders were liable to Cory for damages that might total as much as $2 million.

Cory had contended, among other things, that certain liabilities of Mitchell Mfg. were not reflected on the books and records of that company.

In his letter to stockholders, Alsdorf also reported on litigation in connection with Federal excise taxes. He said that the U. S. Supreme Court has granted the company's petition for certiorari, and it is anticipated the case should be heard during this calendar year.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

when Heating-Cooling's by DUNHAM-BUSH

A new wing at Doctors Hospital, Michigan City, Indiana, promises to serve as a heating-cooling guide for hospitals when versatility is a must.

One part of a two-type conditioning system uses Dunham-Bush remote heating-cooling units with individual room control. This affords threefold benefits . . . patient's personal room temperature preference . . . separate conditioning for nursery area . . . an aid for control of contamination.

A second type system at Doctors Hospital provides 4-zone conditioning for (1) basement and cafeteria; (2) West first floor offices; (3) East first floor offices; (4) interior examination rooms and laboratory. Used in this system are Dunham-Bush Multi-Zone air conditioning unit; packaged water chiller; circulating pumps. Additionally Dunham-Bush convectors are used for waiting room heating.

Heating-cooling product specifiers find in Dunham-Bush a "one source—one responsibility". No need to deal with dozens of suppliers.

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